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THE GOVERNMENT SUIT.

IT WOULD be foolish to attempt to forecast the outcome of the impending government suit against the American Telephone and Telegraph Company. Believers in the "natural monopoly" of the telephone feel, of course, that the company has a strong defence in that theory. Believers in telephone competition, already prejudiced against the company, look for an order of dissolution.

It is pretty certain, at any rate, that whatever the result the company will not suffer directly, any more than the Standard Oil Company has suffered by the court order against it. A public utility has the advantage, too, of a rapidly growing tendency to protect such institutions.

There has been some speculation on the possibility of an open market as a result of the suit, whereby the associated Bell companies would buy equipment from any manufacturer. This is an alluring possibility; but the issue is too easily avoided, assuming for argument that it would be desirable to avoid it. A telephone company is established with a certain line of equipment, and it is natural that future increases will be carried out with the same kind of equipment. That principle, indeed, made for the success of independent factories years ago. It is largely because the telephone business is a repeat order proposition that its manufacturers have prospered and grown large from small beginnings. When a manufacturer installed a three thousand line switchboard in a community of sixty thousand inhabitants, he merely laid a foundation for future sales.

So far as telephone instruments themselves go, it is entirely possible and reasonable to operate several different makes on one system. The only difficulty lies in the discovery by the subscribers that the stations are not all alike, and their perception of imaginary advantages in those other than their own. But it is not reasonable to expect a satisfactory switchboard whose early half is of one make while the later increase is of another. To be sure, the thing has been done. Every manufacturer has had orders for switchboard increases to fit a job originally installed by someone else. Some have managed it all right albeit with little satisfaction to themselves. Others still remember the fearful and wonderful joint which the drafting room worked out to hold the misfit sections together. Every manufacturer has some standards of construction; but no two manufacturers have the same.

So there are many legitimate reasons why a telephone operator continues to buy goods where he placed his first order. If in addition there be some ulterior motive, where is the hope for an open market?

Take the case of a new company. It buys its equipment either of the lowest bidder or of the best salesman. But in an old established system as extensive as the Bell

there are no *new* companies. New exchanges, of course, are installed frequently, and for all the technical objections there are, they could use a different brand of equipment. But can they reasonably be expected to do so?

So much for the hypothetical open market. Academically the most interesting feature of the case will be the determination of the status of the natural monopoly theory. Previous successful attempts of the government to break up monopolistic combinations have been directed at industrial examples. It must be admitted that the public utility is different. The claim of monopolistic right is not confined to the telephone. It is shared by the similar utilities of electric light, gas, etc. Advocates of telephone competition say these cases are not paralled, in that the flexibility of telephone service makes it liable to those irregularities which are best rectified by aggressive competition. These points, no doubt, will be thoroughly considered before proceedings go very far, and we will know positively whether or not such a thing as a natural monopoly exists legally.

It has been intimated that the relations of the American Telephone and Telegraph Company and the Western Union Telegraph Company will be considered in the action. The telephone and the telegraph, however, can hardly be considered in the light of direct competitors. They are scarcely more competitive than the telephone and the railroad—for it is only a few months since a railroad official blamed the telephone for the marked falling off of railway traffic. Telephone and telegraph are both wire-users; that is almost the only point of similarity. And that very point, far from making them competitive, really argues for their co-operation. There are so many economies in the composite operation of the two utilities, and so many consequent benefits to the public, that all telegraph lines should properly be telephone auxiliaries.

The following figures, considered in the report, are more or less familiar to our readers:

The American Telephone and Telegraph Company owns, according to the latest available list, $405,359,400 par value of the $441,733,402 total stocks of 37 companies.

Among the larger telephone companies in the country which the parent concern controls is the New York Telephone Company. The capitalization of this company is $50,000,000, and of this stock the American owns $32,215,700.

Of the Chicago Telephone Company's $27,000,000 of stock the American owns $14,049,600.

Of the New England Telephone and Telegraph Company's $35,024,000 stock the parent company holds $20,807,900. The American owns practically all of the Southern Bell Telephone Company's $21,400,000 of stock.

The American owns $12,047,700 of the Western Electric Company's $15,000,000 of stock; and it owns $32,884,300 of the $41,550,000 stock of the Bell Telephone Company of Pennsylvania.

Likewise it owns over ten millions of the $19,680,000 stock of the Cumberland Telephone and Telegraph Company. It also owns a majority of the $18,000,000 of preferred stock of the Pacific Telephone and Telegraph Company, and also of the common of this western corporation.

The American Telephone acquired a substantial interest in the Western Union Telegraph Company in 1909, and since then has operated more closely with the telegraph company than ever before.

The Western Union alone has $100,000,000 capital stock, with $38,745,000 funded debt, and three leased companies, the Northwestern Telegraph, Mutual Union, and Gold and Stock Telegraph companies. It guarantees return on the securities of various other telegraph and cable companies.

The principal company has had an amazing growth. It was organized under the laws of New York in 1885 with a capital of $100,000. In June, 1896, this was increased to $20,000,000 in 1898 to $25,000,000 in 1899 to $75,000,000; in 1900 to $100,000,000; in 1901 to $150,000,000; in 1903 to $250,000,000; in 1909 to $300,000,000, the latter two increases to provide for the conversion of bonds; and in March, 1910, the authorized capital stock was increased to the present figure of $500,000,000.

Of this there is now outstanding $327,900,300. There are $98,000,000 bonds outstanding. Total assets are $565,523,189.

The company has been paying 8 per cent on its great capitalization for the last six and a half years. The latest announced surplus account is $56,400,000.

DISCRIMINATION ON THE OTHER SIDE.

DISCRIMINATION in point of rates or service between different customers of a public utility is a prolific source of trouble, and one of the first considerations of utility commissions. Where a new franchise is desired, for instance, the temptation is great, no doubt, to ease the paths of progress with extensive promises of free telephones to city departments and officials. The latter always appear to be constitutionally unable or unwilling to see the people must pay for the service in either case. If the company is to be allowed a certain so-called "fair" return on its investment, whatever particular apportionment may be meant by fair, its total number of telephones installed must represent a certain lump income. So the ultimate result is the same whether the city pays for its telephones by drawing upon its tax receipts, or gets its service free while the people pay an equivalent increased rate for their telephones.

But when the company's rates are limited by ordinance, while it is compelled to furnish a certain number of free telephones, there is a possibility of unfairness. And when there are two companies competing in a city, and one is compelled to furnish a greater number of free telephones than the other, the worst kind of discrimination exists—discrimination against, not by the company. In such a case the company, even without the usual rate-limiting ordinance, would be powerless to protect its income by adjusting its rates to balance the free service; for it could not go above the competing rates without losing business. People will not pay a higher rate because their city officials pay nothing at all.

Take a few specific examples: Joilet, Ill., has two companies, each operating on a fifty year charter. From one company the city exacts one dollar per year per telephone. From the other company it gets nothing. In Galesburg, Ill., the Galesburg Union Telephone Company has a twenty-five year charter and gives the city forty free telephones. The Central Union Telephone Company has a perpetual charter and gives Galesburg twenty free telephones. In Rockford, Ill., the Central Union gives the city fifty per cent discount on regular rates, eight free office telephones and a free telephone for each fire hose company. The city is allowed free use of the company's poles for police and fire alarm wires. The franchise has no limit. The Rockford Home Telephone Company's

franchise expires in 1822. It gives the city twenty-three free telephones and special rates on others. The city gets two per cent of the company's gross receipts.

It is surprising how many examples of this kind there are. Where two companies operate in a single community, the last comer gets the worst of it, of course. The first system installed finds a demand for service and proceeds to meet it. When the second company applies for a franchise it is not greeted with open arms, unless, indeed, service has degenerated to an unusual degree, so that competition seems necessary. And in that case, the city officials are doubly cautious. If they have been bitten once, they will be sure they get all there is to be had in exchange for the second franchise.

And so the second company is often doubly handicapped. It must not only give a great deal more for its charter, but must generally promise rates lower than those existing to get in at all.

It is the function of public service commissions to adjust discrimination against utilities as well as by them. Conditions such as those mentioned cannot long exist in states which have provided efficient commissions with jurisdiction over telephone companies.

CITY FRANCHISES AND STATE COMMISSIONS.

THE question whether cities and towns in Nebraska shall have the right to enforce their contracts with telephone companies, as embodied in franchise ordinances, has been made a political issue through the adoption of a plank by the republican convention in Gage county demanding that the people of every municipality be protected in their rights, and that such remedial legislation be enacted as may be necessary to secure this protection. The claim put forth by the Lincoln Telephone & Telegraph Company that the state railway commission now has exclusive jurisdiction over the rates, and that franchise restrictions have no force, is disputed by the following plank which the republicans of Gage county have adopted:

"We are in favor of remedial legislation controlling and preventing the consolidation of telephone companies throughout the county and state for monopolistic purposes, and protecting the rights of the people in franchises granted, or to be granted, said companies, and for providing adequate remedies for the violation of said franchises."

The railway commission itself assumed that it possesses authority to set aside and nullify any regulation affecting service. Its action in nullifying a franchise of that kind at Wymore is what stirred up the people of Gage county and resulted in the matter receiving attention in the platform there. A resident of Wymore has written the Lincoln *Star* on this subject as follows:

"I enclose to you clipping from your paper in regard to the power of the state board of railway commissioners, as to their power to change telephone rates and break contracts under which the people gave their franchises to the telephone companies, on a condition that the telephone company give them service at a maximum rate charge per telephone. You will note that the Lincoln Telephone & Telegraph Company says that when the constitutional amendment creating the commissioners was adopted by the people of the state and the law went into effect, it superseded all provisions relating to rates contained in any franchise passed by the cities and villages. All rates agreed upon in the contract since the law took effect are subject to change by the commission. You note that while the commission has the power to let the company break the contract under which it obtained the franchise, it leaves the franchise in existence under new conditions as may be fixed by the commission in a showing made by the telephone company as to costs, etc., without the consent of the people who are parties to that contract. Either you or the Lincoln company are mistaken as to whether or not the amendment to the constitution creating the board of railway commissioners contained a joker in regard to its power over contracts. You are some distance from the center of the telephone fight, as they begin on us small fellows, where they expect least resistance, and bring us into subjection, a few cities at a time, so they will not stir up the whole state to action at once. When we are brought into subjection and have nothing to fight for, their action will be to conquer the largest places. This is a state fight, and not just a local one, in the locality in which at present it is being carried on. All of the people will have to meet it some time. It is their object to conquer us in detail, a few cities at a time."

Most telephones are actually, and all potentially, more than local. Intended originally to serve only their own community, and so properly amenable to local restriction, they rapidly outgrew the limitations of purely local service, and by demand of the community itself became inter-county and then inter-state in their scope. The status of a properly expanded telephone system, stated briefly, is that while at first it was a part of its city, now the city is only a part of the system.

If commission regulation is to mean anything, the commission's power should be absolute in its jurisdiction. This fact has been recognized in states like Wisconsin, where the commission can grant or revoke franchises regardless of municipal peculiarities. This system cannot be expected to win the immediate approbation of city officials, who are apt to regard it as a usurpation of their prerogatives. Practice proves its soundness, however, as must unbiased judgment also.

TELEPHONE INVESTMENTS.

THOUSANDS of people in this country, among them many widows and old persons, live on incomes of $1,000 to $1,500 per annum derived from investments. Accustomed to the fixed allowance for living expenses, they find the burden of the increased cost of living especially severe. Salaries of workers have perforce increased to some extent to meet the imperative demand; but the return on safe investments has not increased. To reinvest their capital where it will bring an equivalently augmented return, means the assumption of an equally greater degree of risk.

Since 1905 the cost of living has increased, statisticians say, eighteen per cent. An income of $1,770 today is no more than an income of $1,500 was seven years ago. From the investment standpoint, this means that to obtain this equivalent income, funds invested to bring five per cent then must be reinvested to bring 5.9 per cent. There are a number of fairly safe investments that will return close to five per cent. There are few indeed that will bring six per cent and allow the investor his sleep undisturbed. The absolutely safe bond investment, of course, will average nearer four per cent than five. In 1904 only four leading securities out of a list of 56 yielded five per cent or over. In 1912 fourteen out of 38 returned five per cent or more. This indicates not greater safety in the more profitable investments today, but merely greater demand. A great many of these securities are the bonds and preferred stocks of public utilities.

Among these public utility securities it will be found that telephone bonds and stocks will average a net return perceptibly higher than those of other similar corporations. From this fact, the average broker, familiar with figures only, deduces that telephone securities are not quite so safe as other issues. This attitude in turn

reacts to increase still further the net returns on such securities by discouraging their sale and so reducing their market price.

Telephone securities are not particularly difficult of investigation. Under commission regulation they are becoming yearly simpler and safer. Their true factor of value, found by multiplying the degree of safety by the net return, is and has always been extremely high. The investor desirous of obtaining a living income from an investment of $25,000 to $30,000 can find nothing more suitable.

TESTING CABLES.

IT SHOULD be remembered that the terminal ends of cables are often responsible for low insulation readings. All hygroscopic tapes should be trimmed well back from metal lugs, which themselves should be disconnected entirely from the switchboard panels at each end, otherwise most misleading results are likely to be obtained. In damp weather the ends should be warmed to drive off all moisture. This remark applies equally to the test set itself, and to the testing leads, which latter should always be themselves tested for insulation resistance and continuity, both before and after all cable tests.

BURGLARS AND TELEPHONE WIRES.

HOUSES provided with telephones have always been properly regarded as unpopular with the housebreaking profession for obvious reasons. In this day, however, every house worth entering, from the yeggman's viewpoint, has at least one telephone. Indeed, it is a pretty safe conclusion that the dweller in an untelephoned domicile has little more than the bare necessities of life, and none of that surplus which takes the form of jewelry and other readily negotiable merchandise so dear to the heart of the hard-working yegg.

The telephone is the best burglar protection in the world—provided it happens to be in working order when the midnight gentleman calls. It is the easiest matter in the world for the alarmed householder to whisper "Main 13," or whatever the free police number may be, into the transmitter, and have a wagon full of bluecoats on the offender's back before he can cut a pane or push a jimmie. The only good reason why the telephone should be out of order at the time is because the enterprising burglar fixed it that way before starting the job. In this work he is kindly assisted by the telephone company which leads its drop wires into the house by way of the basement, so that to cut them on the outside is almost no trouble at all.

No sane and well regulated householder welcomes a burglar, even though he may not feel physical fear at the thought of such a visitation. And since the telephone, properly installed, affords the best protection against them, why not fulfill the conditions? Drop wires should enter the attic of a house wherever possible. Then the task of cutting them will discourage all but the most hardy of burglars.

The operator can't declare a dividend a month after he cuts in a new telephone system. You can't sell your year's output with a single advertisement. Give 'em a chance to get acquainted.

A Lot of Loaded Lines

A Telephone Triolet.

Hello,
Operator!
(Slow!)
Hello!!
Oh,
Procrastinator!
Hello,
Operator!!!

We have just visited a four-day convention of moving picture theater owners. There were about a thousand of them. Mentally we have been comparing the affair to a telephone convention. Don't turn up your noses at that, telephone men! The picture people are gentlemen, and they all brought their ladies along. But the thing that struck us most forcibly was the tremendous vim, vigor and vitality of the affair. You see, it is a young industry—young enough to make even the telephone game seem old. If we could only re-arouse some of that terrific, world-defying enthusiasm among the independent telephone men of today, they would carry the country by storm.

Is the fire only smoldering, or has it gone out?

CONSIDERABLE MOTOR REACTION.

[From the Pittsburgh *Gazette-Times.*]

It was possible for an experimenter with quick motor reactions and good powers of observation to tell many remarkable facts concerning an unknown person at the other end of the wire. In nine cases out of ten he could tell whether a woman at the other end of the wire was fully dressed or not.

Speaking of linemen named B. B. Steel, Will Rust, and other appropriate monikers, make a place for Miss A. F. Gum, night operator at Eaton, Colo. Besides the name she has put in the following bid for immortality:

[From the *Mountain States Monitor.*]

There is a farmer in Eaton who will not have a telephone because he says our rates are too high, but each evening when he came in from the field he would send his boy to one of the neighbors to get the latest news from the national conventions recently held in eastern cities. On one occasion, the boy, in his haste, stepped on a plank, overturning a $5 hive of bees. The farmer, hearing the boy's screams, ran to his assistance. The bees also attacking him, he made a dash for a nearby cornfield, breaking a barb wire fence and tearing his $6 corduroy trousers to shreds. The mother, hearing the commotion, and hastening to their rescue, dropped her $10 false teeth, breaking them to smithereens. While she was out the baby upset a six-gallon churn of rich cream, then crawled through the cream onto the $24.98 parlor rug, ruining it completely. While the farmer was applying witch hazel and arnica to their cuts and bruises and stings the $75 Jersey cow espied the break in the wire fence and killed herself eating green corn, the farmer thereby losing $125 because he did not have a telephone.

We note by our own pages that Fred. Butt has been appointed claim agent for the Nebraska Telephone Company. It would be a shame to pull a wheeze about claim agents in general being the butt of the public, or something like that.

When is a telegram not a telegram? When it's a postal? No—when it's a telephone message in New York.

THE OLD, OLD STORY.

[Reprinted by Request.]

Their line is gone out to all the earth, and their words to the end of the world.—2 Chron. xx:12. Line upon line, line upon line.—Isaiah xxvii:10. It shall not be lawful to impose toll.—Ezra vii:24. Thou hast nothing to pay.—Proverbs xxii:27. Charge the people.—Exodus xix:21. A daily rate for every day.—Kings xv:30. They were employed in this work day and night.—1 Chron. ix:33. I called him but he gave me no answer.—Song of Solomon v:6. Thou did'st call me.—1 Samuel iii:6. When I call, answer me speedily.—Psalms cii:2. I am cut off.—Psalms xxx:2. Where is the receiver?—Isaiah xxxv:18.

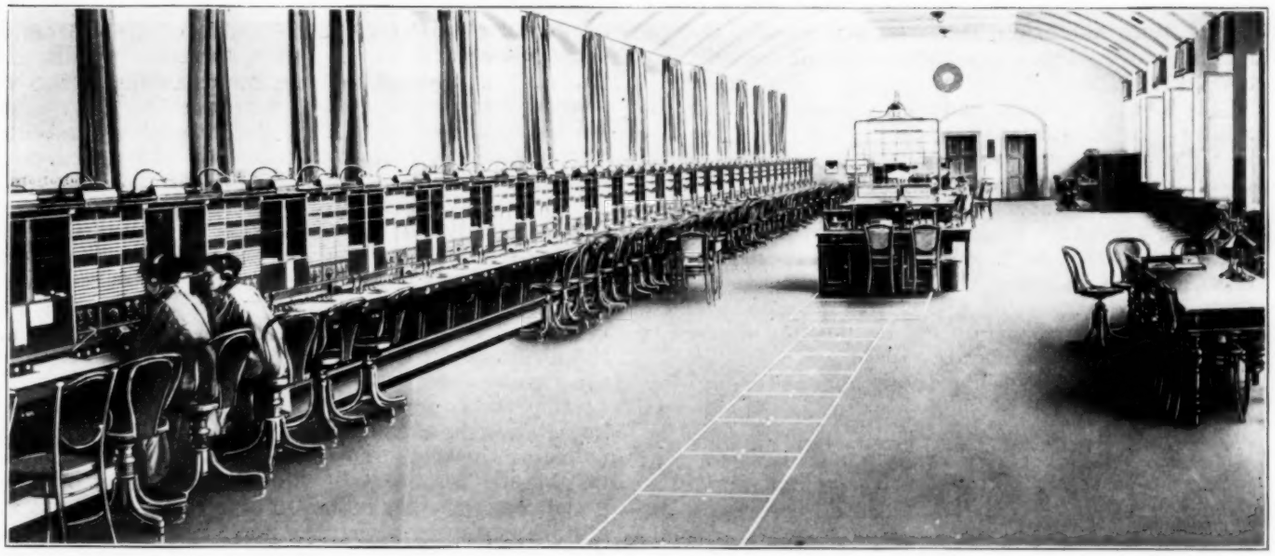


Fig. 1.—General View of Munich's Trunk Line Exchange.

Munich's New Exchange Equipment

By Dr. Alfred Gradenwitz

IN VIEW of the thorough transformation of the telephone system of the city of Munich, where automatic service is being introduced throughout, and the extremely lively development of the interurban telephone traffic, the trunk-line exchange there had to be completely reconstructed.

The new trunk-line exchange, which was inaugurated in March last, is installed in the second story of the central telephone office on Max-Joseph Platz and has been designed for a capacity of 300 trunk lines, 60 suburban and 32 party lines, which are so far operated by means of 29 trunk-line switchboards with a total of 58 operators' positions for the day service, 2 switchboards for the suburban and night service, 2 switchboards for the party lines, 6 record boards, 2 information boards, 2 superintendents' boards, one jack switch, one main and intermediate distributing frame and one fault-finding or test board. A pneumatic post has been provided for transmitting the conversation records to each of the trunk-line positions and a calculagraph and clock system for ascertaining the duration of conversations.

Fig. 1 is a general view of the operating room. The trunk-line switchboards are installed along one of the longitudinal walls with their backs turned toward the window, so as to leave a convenient corridor closed on both sides between the window wall and the switchboard. In the middle of the hall are installed the information and record boards, the pneumatic dispatch distributer, the superintendent's board and a signaling board with exchangeable signs for indicating any disturbance in the lines. On the other longitudinal wall are arranged the two suburban and night switchboards; any further trunk-line boards entailed

Fig. 2.—Recording Positions and Pneumatic Dispatch, Munich.

by a future extension of the exchange will also be here installed. Fig. 2 is a partial view of the hall with the record board in the foreground, next to which comes the pneumatic dispatch distributer and the information board.

The trunk lines, most of which terminate underground at the exchange, are led by means of 14-strand cables to the main distributing board, which is combined in the same frame with the intermediate distributing board. Each trunk line is connected with a service line, traversing all the trunk-line boards, and both can be connected up at the intermediate distributing board to any operator's position desired of the trunk-line switchboards.

Each of the trunk-line switchboards has two operators' positions, and each of these positions comprises 2 or 4 trunk lines (in accordance with their frequency) connected up to a call signal and jack. The jack panel, which is situated in the center, is used in

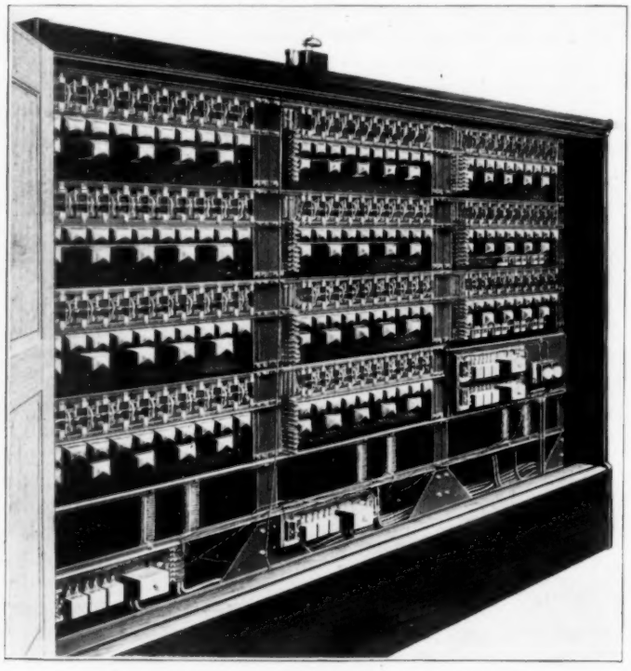


Fig. 3.—Call Selectors Installed in the Switchboard.

common by both operators' positions, open pigeonholes for receiving miscellaneous materials being arranged on both sides of the panel. Between the two operators' positions has been provided a pneumatic post back dispatcher and a calculagraph. Each of the cord sets used in effecting the trunk line connections is equipped with three plugs, viz., an answering and two connection plugs, as well as with a switch for the selective inserting of the two connection plugs. The second connection plug allows the operator to prepare in the course of a trunk-line connection another connection with the same line.

The connection of a trunk line with the local subscriber is effected in the following manner: As a call is received in a trunk line, the call lamp is lighted at the corresponding operator's position. The operator then puts the answering plug of a cord system into the answering jack, thus cutting out the call lamp, and by actuating a two-way switch, inserts her talking set into the calling line. After thus being informed of the exchange and number of the subscriber called, she puts herself into connection with the "break-jack" operator of the corresponding local exchange, by pressing down a service line key. The "break-jack" operator then informs the trunk-line operator of the local connection line to be used, connecting at the same time the line of the subscriber called to this connection line. The trunk-line operator then inserts one of the two connecting plugs into the jack in question, throws the plug selector as well as the two-way switch toward the connection plug, and thus connects her speaking set up to the latter. She is now able by means of the speaking key to call up the local subscriber. Receiving an answer, she places the two-way switch in its position of rest, thus connecting the subscriber to the trunk line. A listening key allows the connection to be checked. While this conversation continues, the trunk-line operator will be able, by means of her second connection plug, to prepare another connection. To this effect, she communicates through a service line in the manner above described with the local exchange concerned, and by inserting the second plug into the jack of the local connection line can communicate with the local subscriber without in any way interfering with the existing trunk-line connection. As soon as a clearing signal appears in the latter, the operator inserts her apparatus by means of the two-way switch, and after ascertaining that the trunk-line conversation has actually been finished, she obtains the new connection simply by throwing the plug selector without any loss of time, disengaging at the same time the first connection plug so that a new connection can be prepared. This arrangement obviously allows the trunk line to be utilized most extensively.

In order to effect a connection with another trunk line, the trunk line operator communicates through a service line with the operator's post in question by inserting a connection plug into the corresponding service-line jack, thus lighting a call lamp at the second operator's position. The second operator then quotes the transit line jack to be used for the connection and by throwing a two-way switch (the transit switch as it is called) connects the trunk line desired with the connection line. The first operator then puts one of the two connection plugs into the transit jack of her position and reverts the plug selector, when the connection is effected. A lamp being lighted at the second operator's position shows whether at the first operator's post the proper transit jack has been plugged, and in a similar manner a checking lamp is lighted at the first operator's position when the transit switch has been reversed at the second operator's post. The end signal with these transit connections at first appears at the operator's position where the cord system has been used for effecting the connection, and is passed on to the second operator's position as the connection plug is removed from the transit jack.

Whenever a local subscriber wishes to ask for a trunk-line connection, he will be connected by his exchange with the record board of the trunk-line exchange. Each record board has two opposite operators' positions. Automatic selectors allow the recording line to be immediately connected up to an operator happening to be disengaged as a call is received at the trunk-line exchange. The selectors are arranged in a special cabinet (Fig. 3) outside of the service board. One of the 12 record positions has been arranged as

emergency and night-record position and is used for day calls only in case all the remaining recording operators should be busy. As the call lamp of the recording position is lighted, the operator connects immediately with the line calling up and after receiving the call, transmits the filled-in record form by pneumatic dispatch to the pneumatic post distributer whence it is sent on to the trunk-line position in question. After receiving the call, the operator disconnects herself by pushing back the key and places the selector at the same time in its position of rest by pressing down a releasing key. In order to prevent the operator from omitting this operation, a lamp is lighted on throwing the answering switch and is cut out again as the releasing key is pressed.

Special trunk lines at the jack switch are, during the night service, connected up to the two suburban and night trunk-line switchboards, while the recording lines are connected up to the emergency and night record position. This switch at the same time allows the trunk lines with their service lines to be connected up to each of the operators' positions, and also serves for effecting a double speaking connection. It further allows any test to be effected most readily and rapidly, checking any line where a fault has occurred and superintending the whole service by means of signaling and checking lines without the knowledge of the staff.

The two information boards, comprising a total of 8 operators' positions, serve to answer inquiries as to trunk-line connections to be effected, the presumable time of waiting, etc. The operators of the information department are able to communicate by means of service lines or by pneumatic dispatch with each of the operators' positions concerned.

The general superintendents and hall superintendents are able to communicate from their operators' positions with the checking devices fitted to the switchboard and with some other departments, such as the test department, the jack switch, the emergency position of the record board, as well as with all local exchanges. The hall superintendents' switchboard also comprises connections with the pneumatic dispatch.

The superintendents' board of the test department is installed beside the main distributing board. The operator in charge of this position can communicate with the general superintendent, the switchboard superintendent and all local exchanges, being as well called up from each of these positions.

The accumulator batteries supplying the operating current are installed in the basement of the building and are charged by a convertor and switchboard connected to the continuous-current city mains.

Telephone Boycott at Checotah

As the result of a general boycott of the telephones in Checotah, Okla., the corporation commission is endeavoring to bring about a satisfactory settlement between the citizens and the telephone company. The former have protested vehemently against the quality of service accorded them by the telephone company, and claim the latter has paid no attention to their complaints. On August first, the plan of boycotting the telephones was suggested and telephone users eagerly complied with it. Since then telephone service in Checotah has been abandoned.

Rate Readjustment in Baltimore

Officers of the Chesapeake and Potomac Telephone Company are said to have admitted, during a conference with the Public Service Commission, that its rules and rates for tie lines and mileage have been unfair to subscribers.

For tie lines—that is, for example, private lines running from an office of a firm in the city to its factory in the outskirts—the rates have been $6 for distances not exceeding 300 feet and for distances in excess of that, $12 per quarter mile or fraction thereof. Mileage, or the cost for wires between the home of a subscriber in the country who uses a city exchange and the corporate limits, bore the same charges.

It has been claimed by subscribers that the rates are too high, and that the practices of the company in determining the quarter-mile zones and in charging for a full additional quarter mile whenever there was the slightest part of one used, were unfair.

The company admitted that in most instances the complaints were well founded, and expressed itself as desirous of bringing about a better condition.

It was suggested that 600 feet at $6 be taken as the minimum for tie lines and mileage and that determination of further charges be based upon zones of one-tenth of a mile at $2.40 a zone.

In the measuring of distances it was pointed out that it is impracticable to proceed along an air line, but the company were willing that the order of the commission prescribe the most feasible route, and that the actual distance charged for in no instance should be more than twice the air line.

If these suggestions were taken it is argued, 75 per cent of those using tie lines or mileage would have a reduction.

Government to Sue Bell Telephone

The government will file suit within a few weeks for the dissolution of the $500,000,000 American Telephone and Telegraph Company, charging it with violation of the Sherman anti-trust act. The bill to be filed will be under the act's civil provisions and will seek the same results obtained in the successful suits against Standard Oil and American Tobacco Companies. There has been an intimation the company will be given a chance to dissolve voluntarily.

The "Bell Company" will be charged with absorbing independent telephone and telegraph companies all over the country and maintaining a virtual monopoly in the former field. Its control extends into the electric manufacturing field through its control of the Western Electric Company, the second largest company of the sort in the United States, and is felt in numerous associated fields.

The American Telephone acquired a substantial interest in the Western Union Telegraph Company in 1909, and since then has operated more closely with the telegraph company than ever before.

The Western Union alone has $100,000,000 capital stock, with $38,745,000 funded debt, and three leased companies, the Northwestern Telegraph, Mutual Union, and Gold and Stock Telegraph companies. It guarantees return on the securities of various other telegraph and cable companies.

Investigations has been going on in Chicago, New York, and the other large cities where the Bell is in control.

What One Woman Thinks

By Sarah Elizabeth Brown

SOME of my friends tell me I'm going stale; that I'm a suffragette; that I moralize too much and muss things up too little. It is one of the penalties of writing. You try it, my brother, and you'll find out. I used to tackle this job with misgivings in my heart and a mop rag in my left hand, but not any more. It is the best of my recreations and I fix up for the occasions. There is a big screened-in porch at my home, on the east side of the house. There are vines creeping up to the roof and in the crevices are some friendly spiders who rush out on their webs and gobble up a gnat or a mosquito and scurry back. Up under the eves are some wasps that are busy from morning till night, flitting between their quaint little mud houses and the watering tank. Occasionally a humming bird buzzes up to a nasturtium bloom in the flower box and darts away. The leaves of the cherry trees rustle in the breeze; the wind-pump creaks as the vane swings about and the chickens sing in the shade of the gooseberry bushes, where they wallow. Now and then an automobile honks by in a cloud of dust, but these simple distractions are constant and I give little heed to them. My mind is on a blank sheet of paper which lies before me and in the batch of clippings that are scattered about on the table.

* * * * *

The fun starts. Here I have a three-page advertisement, taken from one of the popular monthly magazines, which tells me that Paul Latzke—America's most distinguished industrial writer—will lead a movement to take the corporations out of politics. In listing P. Latzke's work there is no mention of his great *Success* serial, which finally took the form and title, "A Fight With an Octopus." Latzke is billed for big things. He is going to prove that the A. T. & T. Co. is a lily-white, golden slippered little angel. It is a simple task, he says, if properly approached. I wonder. I've heard of pussy-footed people and gum-shoe artists, but how will Latzke reconcile his present belief with his past performance? This advertisement leaves no chance for doubt. If you want your corporation to thunder down the perfumed vistas of time, let Paul do it. He is the foremost industrial writer—the announcement says so—and for a specified sum he will fix you up so the people will rise as a unit and call you blessed. In other words, Latzke is now ready to do for others what A. T. & T. seems to have done for itself.

* * * * *

But more seriously, I'm thinking that there would be more doing in the telephone business, if P. Latzke was back in the game. I'm sure he would take a wallop at an item like this, which crops up without any apology whatever, in the half-yearly report of the Bell system:

> The process of steady absorption of independent telephone companies at various points throughout the country continues its regular course. There is nothing spectacular nor wholesale about it. It is a natural growth aided, stimulated and acquiesced in by a genuine public demand for the termination of the nuisance of a duplicate telephone system.

Here we have all the incentive, including the old, alleged insult that competitive telephony is a nuisance. The result of the Bell system's advertising settles the nuisance emphatically upon the public. Latzke would fight back, whether he made a nickel or not. His *Telephone Weekly* was an anti-Bell paper for fair. Other papers that have championed the independent cause for years have grown lukewarm. The last fire-eating belligerant has declared himself as against anything but constructiveness. The sentiment is based upon a complete change in conditions. Now, will some kind philanthropist tell me what constitutes the "complete change?" I really want to know. Will a carefully planned advertising campaign get the full credit of making two telephones a nuisance? Have you concluded, to your thorough satisfaction, that two bills and two bells are objectionable as compared to the truer condition that the service was better under competition than it is with a single system? I find no end of items like this, for example:

> The business men of Lincoln (California) are much elated at the report that there is a strong possibility of an independent local telephone company being organized here in the very near future. It is stated that the proposed corporation will be composed of local capitalists and moneyed men from Sacramento and San Francisco, some of whom are vitally interested here, and especially in the real estate in this section of the county. The corporation will not lack capital, as the promoters are men of wealth and prominence thus insuring both financial and commercial stability for the enterprise. For some time past there has been a great deal of complaint at the service given here by the Sunset Telephone Company, which is largely due to the fact that the central office at Lincoln must depend for its long distance service entirely upon the offices at Auburn and Marysville. Those who are compelled to use the telephone here object to the delay that invariably results when calls are put in for out-of-town points. It is claimed that the business of the Lincoln office fully justified it being made an independent central exchange, and not dependable upon the caprice and leisure of the offices at Auburn and Marysville.

I can't see that there isn't as much need for competitive telephony today as there ever was. I see no way for a single operator to handle the business of the entire country. I believe, as I have often expressed myself, that the independents have simply lost the art of self-preservation. They are willing to sell out and quit. There are more people in the country now than were here when independents started to build systems. The country is far from the saturation point. The replacement of worn out instruments offers a greater field than the unoccupied territory formerly offered. The Bell system shows a gross earning of $32 per station. Thirty-two dollars per station will build a country line. It has built many of them. In the government's forest service are only 7,000 miles of telephone lines. There is need for 45,000 miles more. I read this in the *National Geographic Magazine* and cite it as an example of opportunity. A dual system isn't needed in the protection of our forests, but an independent manufacturer should have an equal chance with the A. T. & T. Co.'s factory to supply the equipment.

* * * * *

I see that the government asks the big Bell operator to give an account of itself in court. I'm thinking that A. T. & T. Co. wishes, for the moment, it could hide its factory. There is an old law in the Massachusetts statutes which declares against a corporation owning its manufacturing auxiliary. It sounds good to me. If the A. T. & T. Co. would submit its equipment schedules to

independent manufacturers the chances are good that it would get more for its money than it gets from itself. Maybe the Attorney General of these United States can see through a hole in the fence!

* * * * *

I know this: There are mighty few better pursuits than the telephone offers. There is bound to be a future in it for more than one combination of capital. There is no decent reason why an independent operator cannot continue to serve his public with satisfaction and with profit. There is no law that says he shall not buy apparatus where he can get the most or the best for his money. It is nonsense to sell profitable business under the threat that you'll be cut off, or gobbled up, or some other equally silly proposition. We need new blood in the game—the old gang has grown old—gone stale. It isn't me.

* * * * *

If this were a society column, I would refer to telephone men with the prefix "Mister," but inasmuch as it isn't, I call men by their real names. I am thinking of Frank Davis of Ohio—the man who represents J. P. Morgan's independent telephone investments in the Buckeye state. Frank Davis says there are no negotiations pending for a general merging of Bell and Morgan lines. I prefer to call them Morgan lines, instead of independent lines, because it sounds better. Davis is president of the Columbus company. He is as smooth as Morgan can wish for, but he appeared before the state's public service commission on a business mission, a little while ago, and said some things. Every telephone man in Ohio was listening and the gossip ran around pretty fast and Davis had to say something else to get the affair straightened out. This is his latest contribution on the subject:

> The Morgan interests are holding these independent properties in the interest of the independent telephone companies of the state generally and for their protection. No such merging of telephone interests will be made anywhere until all these independent telephone companies throughout the state, have had an opportunity to make such arrangements as will take care of their situations. We will not do anything that will necessarily sacrifice these extensive independent interests.
>
> That is the first necessary thing in the preliminaries for any such combination of Bell and independent interests in Ohio. The second is that there be a public demand for such merging of interests. It will take place when and if the public served wants it. And, not otherwise.
>
> That, you see, is all somewhat in the future, and bound up in contingencies. Understand that I am not presuming to speak for the independent telephone interests in either Cleveland or Toledo. I am not president of those companies, and am not authorized to speak for them. My own guess would be that they would be governed in the matter in the same way.

Now if you can get any satisfaction out of the Davis statement, you are a different kind of independent operator from what you used to be. As a matter of truth, there isn't a thing being done to enhance the value of the Morgan properties. They are remunerative and they are being held by Morgan for the Bell Telephone Company, or I am the poorest prognosticator who ever offered a guess.

* * *

The Des Moines *Capital* wants another independent telephone system for Iowa's state capital. It says the removal of competition has worked to the detriment of telephone subscribers. Quoting further, I find, "There are more complaints today over delays in getting connections, in suffering 'cut offs' in the midst of conversations and in poor service generally than ever existed when Des Moines had two telephone systems." I shall always maintain that the best telephone system is the one that has been honestly built with local capital; operated by a man who knows how best to serve his community and understands what his franchise stands for. A system of this kind never finds itself waiting for somebody to come along and buy it. When the conditions warrant, interconnection with other systems—either independent or Bell—is commendable. It enhances the value of the local system without turning it over to a monopolistic body.

* * *

I see that the independent system at El Paso, Texas, has thrown up the sponge, and quit. If my memory serves me right, this particular system was promoted by a woman—a Mrs. Annie Brett. I can see her picture now—holding a lily. Well, with that woman in the discard, I'm left alone. I'm thinking some of quitting myself.

* * *

Billy Handlan of Wheeling won't stay put for a minute. He is worse than the Bull Moose in politics. About the time the old National begins to show signs of coming to, Handlan takes a mighty crack at it by yelling "stop thief." He warns stockholders to look out for the nigger in the woodpile on a reorganization plan recently submitted and doesn't number his words. But at that, the plan seems to be going through. This same Handlan is suing the Keystone Telephone Company of New Jersey, asking that it be restrained from buying Continental Telephone & Telegraph Company notes. It seems that Burly Bill owns some Keystone stock—which, by the way, is pretty good stuff to own. I wish I knew the details concerning telephone affairs at Wheeling. There must be some good stories that are not finding their way into print.

More Telephones for Pittsburg and Lake Erie

The Pittsburgh & Lake Erie Railroad some time ago installed a telephone train dispatching system on its lines, and is now preparing to supplement this, in part, with a selectively operated "message wire" to be used for transacting only commercial affairs. No train movement orders will be handled over this line.

The Western Electric Company, which furnished the apparatus used on the train dispatching circuits, will also supply that to be used on the message wire, which will extend from McKee's Rocks to Woodlawn, Pa., a distance of approximately seventeen miles. A full metallic line built of No. 12 B. & S. copper wire will be used, along which fifteen way stations will be equipped with No. 101-B selector sets, containing the standard No. 50 type selector.

This telephone line will terminate in the road's private branch exchange and the calls will be handled just the same as on a party telephone line, the switchboard operator calling each station without signaling the others.

Telephone Girls' Union in Massachusetts

The Boston Telephone Operators' Union is fast spreading its strength throughout the state of Massachusetts. Its representatives are busy unionizing the operators in the various cities and they are meeting with little or no opposition anywhere. A recent visit to Lynn of two Boston operators meant the forming of a new local there and now more than two-thirds of the operators are union workers.

Ionized Gas for Telephone Repeaters

By C. D. Lindredge

IN ATTACKING the repeater problem, inventors have been exercised mainly in developing the repeater-transmitter, and in devising circuits for two-way working to allow repeaters to be used on commercial lines where transmisson is required in both directions. In all commercial repeaters, a repeater-receiver has been used of the common electro-magnet type such as used at telephone subscribers' stations. The main difficulties have been experienced in obtaining an undistorted amplification, and in preventing the amplified currents from reacting upon the repeater and causing it to "sing." These difficulties have been only partially overcome, with the result that repeaters are used to only a limited extent, and are confined entirely to non-loaded lines.

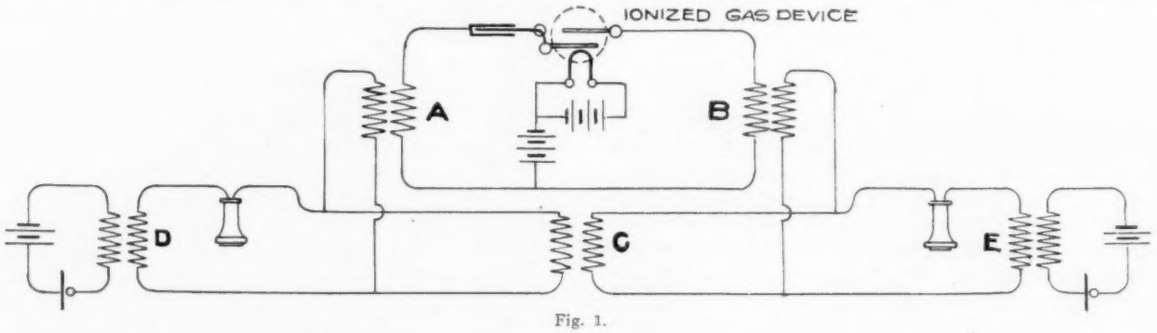


Fig. 1.

Among other suggestions it has been proposed that ionized gas be used as the repeater-transmitter. It can readily be influenced by an electromagnet placed near the containing vessel. By removing the diaphragm from a telephone receiver and holding the electromagnet close to the containing vessel, the ionized gas space may be made to undergo variations in resistance corresponding to sound waves, and to thus constitute a form of telephone transmitter. This has been shown by Cooper Hewitt using a mercury vapor tube and by De Forest using the Audion wireless telegraph receiving device.

Ionized gas devices have been widely used in wireless telegraphy, the Fleming Oscillation Valve having been used by the Marconi Company for transatlantic service. When connected in a wireless receiving circuit to utilize the "non-linear" form of the characteristic curve of ionized gases, the received oscillations are caused to vary the flow of ions across the ionized gas space thus varying the current passing through a telephone receiver. The device is self-restoring and responds loudly to feeble oscillations.

In using ionized gas to amplify telephone currents by means of the circuit arrangement shown in Fig. 1, the received potential variations are caused to vary the flow of ions across an ionized gas space in a similar manner. The received currents are stepped up by means of the transformer A, and the reproduced currents are stepped down by means of the transformer B. These transformers are placed in parallel with the transformer C. No reaction results from these connections owing to the repeater being entirely potentially operated and being consequently unaffected by its own amplified currents providing that they are stepped down sufficiently by means of the transformer C. With the windings of the transformer C transposed the repeater "sings." With a 1:1 transformer at C, the question of whether the repeater "sings" has been found to depend upon the temperature of the filament of the ionized gas device, and the length of line on each side of the repeater.

The amplification with this arrangement is ordinarily in one direction only. A gain in transmission is obtained in the direction D to E, and a slight loss in transmission results in the direction E to D. Two repeaters arranged to provide one-way amplification, and to provide for two-way transmission may be used in place, or in addition to a single repeater arranged for two-way amplification. By locating them at each end of an open wire line, and arranging them to provide amplification only at the transmitting end, the transmission currents may be amplified without amplifying line disturbances.

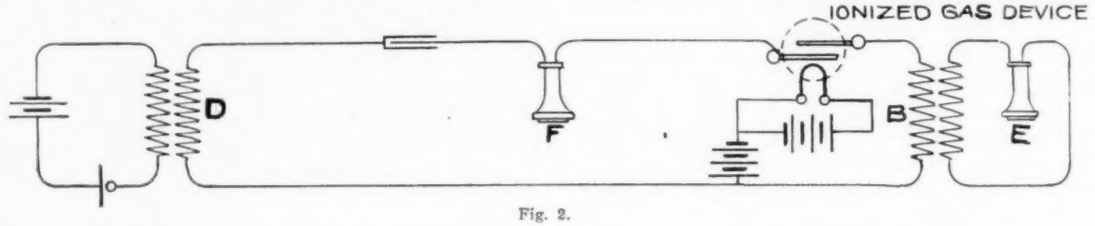


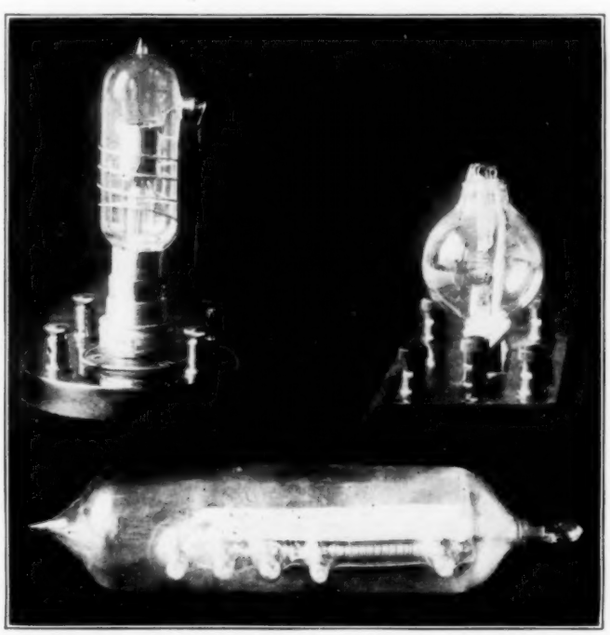
Fig. 2.

A repeater may be used to advantage even if it does not result in a net gain in transmission. The loss in transmission without the repeater, in the direction E to D in Fig. 1, may equate to twenty-eight miles of standard cable, and owing to low current through the transmitter at D, may equate to thirty-four miles of standard cable in the direction D to E. A repeater may then be used to advantage if it produces a gain of two miles in the

direction D to E, even if it results in a loss of four miles in the opposite direction.

A characteristic of the repeater, which makes it somewhat difficult to determine the exact amount of gain introduced by it in a circuit, is the effect it has under certain conditions upon the quality of transmission. This effect is very noticeable using three new dry cells in the local circuit, at the transmitting station, but is slight using two dry cells at the transmitting station, each measuring about 1.2 volts. The gain introduced by the repeater on a thirty-two mile artificial cable is greater with dry cells in the local circuit at the transmitting station which have been in use for some time. This is apparently due to the voltage component of the power transmitted, being in this case large compared with the current component.

The number of the turns and the resistances of the windings of the transformers A and B, are such as to make them differ considerably from those at present used in telephony, the requirements of the transformers being somewhat novel. The transformers or induction coils



Ionized Gas Devices Used.

very commonly used in telephony are required to produce low resistance local circuits and to overcome line losses. In many cases both of these objects are accomplished by a single transformer as at D and E, in Fig. 1. The transformer A, however, is required for the novel purpose of increasing the power absorption of a device which is of negligible power-absorption to currents at the potentials used in telephony. That the device is of negligible power-absorption to such currents may be shown by connecting an ionized gas device as shown in Fig. 2. With this arrangement, using commercial telephone apparatus, transmission from D to E, with or without the transformer B, is possible, but it is not as good as it is with the ionized gas device removed from the circuit. Transmission from D to F, however, is impossible in either case, showing that the line is practically an open circuit. The transformer B is required with the arrangement shown in Fig. 1, to bring the ratio current to potential back to approximately its former value.

In this repeater an ionized gas device of the Fleming Oscillation Valve, the De Forest Audion, or a similar type may be used. In using the Fleming Oscillation Valve the electrode connected direct to the condenser may consist of a few turns of wire wound around the bulb. A much more satisfactory method, however, is to use two oscillation valves connected in series with the condenser wired to a point between them. By omitting the transformers A and B, the reproduction in all the tests that have been made has been less than that necessary to produce amplification.

These transformers are constructed as follows:

TRANSFORMER A.

Core—Length, 4¾ in.; diameter, ¾ in.

Primary—1,000 turns No. 30 enameled wire, wound over core. Resistance, 25 ohms.

Secondary—20,000 turns No. 40 enameled wire, wound over primary. Resistance, 4,500 ohms.

TRANSFORMER B.

Core—Length, 4¾ in.; diameter, ⅜ in.

Secondary—500 turns No. 30 enameled wire, wound over core. Resistance, 9 ohms.

Primary—15,000 turns No. 37 enameled wire, wound over secondary. Resistance, 1,600 ohms.

Owing to the small number of turns in the secondary winding of the transformer B, the best results with this particular transformer are obtained when the impedance of the apparatus at the station F is low. By using three commercial telephone receivers connected in multiple in place of the terminal apparatus shown at E, a decided amplification is very readily obtained, and with the filament of the ionized gas device at a comparatively low temperature. A higher impedance at E necessitates the use of the filament at a higher temperature.

Good results are obtained using ionized gas devices provided with 2 watt tantalum filaments operating upon about one-half ampere of current and requiring a battery of 24 or 48 volts connected to the transformers A and B. The condenser may be of four microfarad capacity.

Michigan Merger Activity

With the approval by the state railroad commission of the purchase by the Michigan State Telephone Company of the Home and its subsidiary independent telephone lines in and about Wayne county, the formal work of the transfer of the property will be begun at once.

The first step, officials of the Michigan company say, will be the preparation of deeds, bills of sale and the assignment of contracts. The stock books will be carefully checked up and then the Bell company will turn over the cash for the property.

The Bell company has hundreds of applications on its books for instruments which have not been put in. As soon as the formal transfer of all the property is made, these subscribers will have their telephones, and it is expected that within a very few weeks the company will have caught up with its orders and have wires and equipment enough on hand to attend to all applications promptly.

Duplicate equipment about the city and on the country lines will be taken out and the independent instruments will be supplanted by those of the Bell pattern.

All contracts which the independent companies had with outside exchanges will be carried out by the purchasers.

How We Built a Telephone Line

By C. W. Meyers.

IT WAS this way. The farmers of the Ahwahnee valley in California had the use of a telephone line owned by a wealthy and enterprising citizen of a neighboring town. The service was good, the rates not burdensome, and they were well contented with it. But the owner had a good offer for his line, and naturally accepted it. The new owner got the idea that the farmers had become so accustomed to the benefits of a telephone service that they could not do without it, and so they had, but he also got the idea that they would pay any amount charged for the service and stand for any kind of regulation that he chose to establish, but in this he was mistaken.

Well, the transfer hadn't long been made before the price of service was doubled, and many apparently onerous regulations were enforced, which made the telephone burdensome. The result was that a meeting of the farmers affected was called, 22 neighbors, who were interested in the matter came together, and the outcome of much discussion and argument was a resolution to build a co-operative telephone line for themselves and operate it in their own interest.

The first matter to decide was an appropriate name for the line and the company, and "The Mountain Farmers' Telephone" was decided upon. Articles of agreement were drawn up, and as this was to be a purely co-operative line, these, of course, bore equally upon each one interested. It was decided to build a first-class metallic line, each member to bear an equal proportion of the cost of construction and each one to do an equal proportion of the labor of erection. A competent man was chosen as manager, or superintendent of construction, and he was authorized to call upon the members when he was ready, for their labor. In case any of these could not be present he was authorized to employ other help on a basis of $2.50 per day, and collect the amount from the party failing to respond. This was, of course, to equalize the work, and each member performed his proportion of the labor or provided or paid for a substitute.

When the day for work arrived there was a full complement present and they were divided into working gangs. One of these was started at each terminal point of the line and they worked toward each other, meeting at the half-way point. Our superintendent took charge of one of these parties and appointed a foreman, who took charge of the other, and the work was under the direction of these two men.

This line was to be built in the foothill and mountain section, and over a very large portion of the way we encountered a great deal of brush, which we had to cut through, this constituted a large part of the work, and would be unnecessary in most places. But I am now telling about our experience in building a mountain telephone line, so will not digress to estimate what might have been under other conditions.

Working a great deal of the way through timber and in the lower portion through a country where there were numerous oaks and other trees within easy reach, we required very few poles, and this of course, greatly reduced the total cost, although the labor of brushing out the way would nearly offset this. Over the greater part of the way we attached the wires to growing trees, using a pole occasionally to avoid too great a bend or to reach a house.

The first work done, was by one of our party who was sent ahead to select the most feasible route and select trees, upon which to stretch the wires. These he blazed for the information of the men who followed. Following him came the brush cleaning squad and these cleared the way for the wire men and others whose duty it was to hang the brackets and put the insulation in place.

Now all was ready for stringing the wires, and this was the simplest and easiest part of the whole work. One of the party drove a horse, which was hitched to a coil of wire—a coil of wire contains half a mile—and as he drove the wire was reeled off. On a crooked road, such as we had in the mountains, it requires a heavy pull as the wire gets toward the end of the reel, for half a mile, with all its dips, spurs and angles, together with trees and rocks in the path, offers a good deal of resistance, and it required a world of humoring sometimes by others of the party who eased it around or over obstacles. Having the wire laid, the next work was to get it stretched on our improvised poles, and for this purpose a number of our party were engaged in the various parts of the work, some stretching the wires to their greatest possible tension, in order that the two should be so far apart that they would not interfere and short circuit themselves, others in fastening them to the insulators, etc. In short we all worked together and made a good job of it, glorying in the fact that we had a self-owned and self-operated, as well as self-constructed line.

With the lines all stretched, the next thing in order was the installation of the instruments, and to this end we secured an excellent instrument, said to be the best for our purpose. This has a five-bar magneto or generator and 2,500 ohm ringer, with lightning arrester and fuses to prevent all possibility of danger from lightning.

We have no central, but separate bells, each one having a distinct signal for himself, and so we call each member directly.

In the future, should the requirements on our line become excessive, we shall divide it into two sections or more as necessity may require, and connect the sections by a switch located at some store or private house where it can be attended to.

When the line was completed, a meeting of the stockholders, or members was called, for the purpose of estimating the cost and levying an assessment. Some of our members were dealers and gave the benefit of their discounts to the company, which somewhat reduced the cost of material. We found that it took nine days to build the line, and this time was contributed by the members or their substitutes.

The material, including wire, brackets, insulators, and nails, with freight, which was something over $100, came to $23.70 each. The retail price of the telephone is $16 each, but buying in quantity and getting

the trade discount they came to about $12 for each of our members.

The line, consisting of two wires, cost us about $42 per mile complete, and the whole work came to $46.82 for each of our members.

The care of the line devolves upon the members, each one looking after a stretch between himself and his neighbor, and for this no compensation is allowed. The officers of our company consist of a board of three directors, the president of the company being also chairman of the board of directors, and a secretary and treasurer. These meet twice a year, or at the call of the president, and all serve without compensation.

New members can be admitted, with the consent of the board of directors, upon payment of their pro rata of the original cost, about $46.82. If they live close to the line, the cost of connecting their service line with the main line will be deducted from this amount, and this line becomes part of the whole system.

There are other lines in this vicinity, and we have arrangements by which an exchange of service is extended, so that in our mountains we have telephonic communication with all parts of the country and with the outer world.

We have adopted a set of by-laws to prevent the abuse of our line among which, for instance, persons caught eavesdropping or listening to other's communications, will be assessed a fine of $10 and be cut off from service until the fine is paid, and for a repetition of the offense will be disconnected from the line, and cannot be again connected until they have paid the fine and received the consent of two-thirds of the members. There are also penalties for using the line more than seven minutes, for gossiping or visiting over the line, and for other abuses of the system.

In conclusion, the farmers of the Awahnee valley, and its central town of Oakhurst, have a first-class line, they own it themselves, are restricted by no rules except those of their own making and in their own interest, the cost was comparatively little, and with it there is a feeling of independence that is worth it all.

Telephone Fight in Portland

At the Mutnomah Hotel in Portland, Ore., a force of employees of the Home Telephone and Telegraph Company started the work of substituting Home telephones for those of the Bell company. The latter went into Circuit Court for relief, setting up a three-year contract with the R. R. Thompson Estate Company, entered into January 11, 1911.

This contract provided that the Bell company was to furnish the hotel with telephone service for three years from the date of its opening, which was February 15, 1912, and it called for ten trunk lines out of the building, a three-section multiple switchboard and 500 house telephones. According to the complaint, the contract was assumed by the Multnomah Hotel Company, which was organized with Phillip Gevurtz as president, to operate the hotel.

The complaint alleges that on May 3, 1912, the Multnomah Hotel Company entered into another contract with the Home Telephone and Telegraph Company, whereby that company was to install its telephones.

The conduits, runways and interior wiring of the hotel were built in by the R. R. Thompson Estate Company, which constructed the building, and are under lease, together with everything else connected with the structure to the Multnomah Hotel Company. This is referred to in the complaint and it is said that only one telephone company can reach the rooms with its instruments.

Circuit Judge Gatenbein granted a temporary injunction, restraining the R. R. Thompson Estate Company, the Multnomah Hotel Company and the Home Telephone and Telegraph Company from substituting Home or automatic telephones in the Multnomah Hotel for the telephones of the Pacific Telephone and Telegraph Company.

Oklahoma Commission News

In the case brought by the Fort Supply Telephone and Telegraph Company against the Home Enterprise Company of Woodward, Okla., an order was issued with the consent and approval of the latter company, now controlled by the Pioneer, requiring it to make physical connection and give interchange of service.

The order requiring the Western Telegraph Company to maintain an uptown office at Woodward is agreed to by that company. It agrees to telephone all messages to the Santa Fe signal tower, where messages have heretofore been received, when the office is not open and in case of any delay to telephone them to Oklahoma City for transmission without extra charge to the senders.

The Corporation Commission has positively declined to interfere with the internal difficulties of strictly mutual rural telephone companies, holding that a strictly mutual company, not rated for hire, was not under the control of the commission. The case was one in which William Gallant filed complaint against the Four D. Telephone Company, a rural company making connections with the exchange at Perry, asking that it be required to allow him to connect with its line. The commission decided that it was a controversy over the ownership of a share of stock in the company and that it was not within its jurisdiction to determine property rights.

Flirt with Telephone Girls? Not in Spokane!

It's a foolish person who would try to flirt with a Spokane (Wash.) telephone operator—that is, while the operator is on duty for the telephone company. For the "hello" girl's vocabulary is restricted to a courteous "number?" and if, after that greeting, anything but the proper response is forthcoming, the telephoning party will receive an advance announcement of an early and icy winter in the frost-bitten message, "Chief operator: Did you want a number?" that comes to him in answer to his "'Morning, girlie, how's Miss Ribbons today?" Thus will the flirting male population of Spokane be subdued and thus, also, will the efficiency of the Bell telephone service be increased, so the company declares. There are to be no half-way measures about this new system, either, as the company has engaged a professional elocutionist to instruct the girls in the art of handling ice-clad phrases properly. The chief operator is known as the "official lemon" and E. L. Breene, district traffic manager, declares the system quite necessary for the assurance of the best possible service.

Telephone Statistics of the World

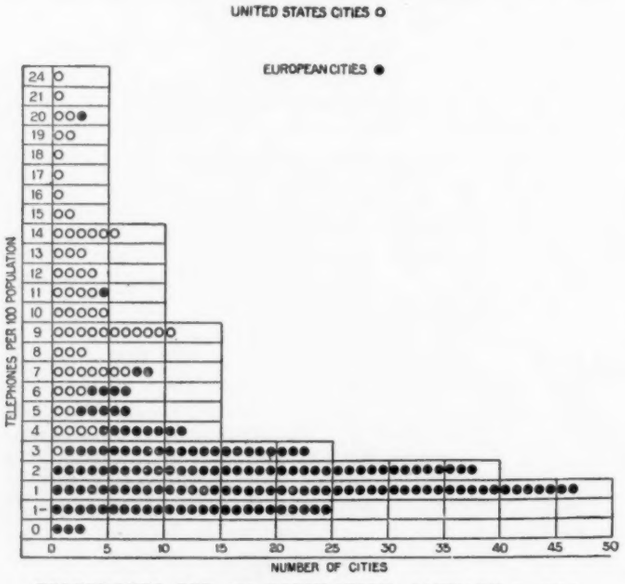
Compiled by Statistician, A. T. & T. Co.

THE subsequent statistical table shows the telephone development of the world January 1, 1911. At that date the United States had 67.4 per cent of the total telephones, Europe had 26.3 per cent, Canada 2.5 per cent, thus leaving but 3.8 per cent for all other countries. The high percentage increase during 1910 for Bosnia, Greece, and Servia, is due to the fact that these countries are just beginning to be developed.

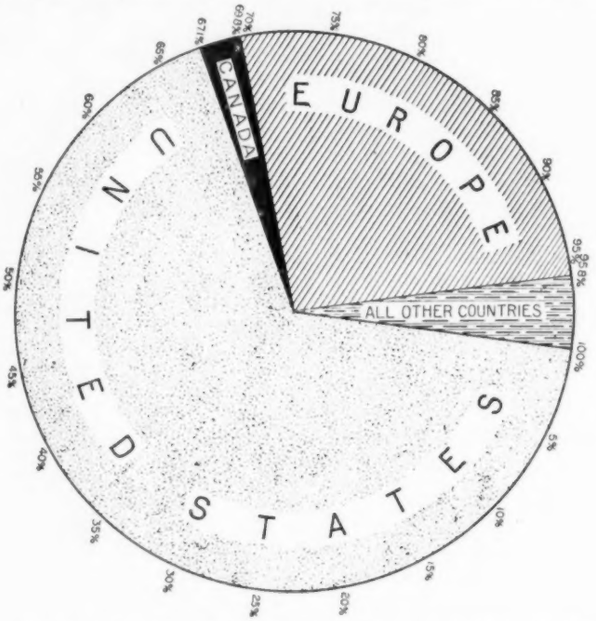
TELEPHONE DEVELOPMENT OF THE WORLD, JANUARY 1, 1911.

Division—	Telephones Jan. 1, '11	Inc. during 1910 Number	Inc. during 1910 Per cent	Per cent of total	Telephones per 100 population	Pop. per sq. mile
United States	7,595,938	600,246	8.6	67.4	8.1	30
Canada	284,373	45,184	18.8	2.5	3.7	4.7
Europe—						
Austria	112,604	16,764	17.5	1.0	0.4	246
Belgium	47,648	4,907	11.5	0.4	0.6	663
Bosnia	747	151	25.3	...	0.04	96
Bulgaria	2,303	253	12.3	...	0.05	116
Denmark	94,531	7,095	8.1	0.9	3.5	182
Finland	30,478	.....	..	0.3	1.0	21
France	232,743	21,079	9.9	2.0	0.6	190
German Empire	1,068,849	100,748	10.4	9.5	1.6	310
Great Britain	648,832	45,235	7.5	5.8	1.4	371
Greece	1,792	290	19.3	...	0.06	107
Hungary	58,506	7,481	14.6	0.5	0.2	167
Italy	70,139	7,873	12.6	0.6	0.2	312
Luxembourg	3,334	220	7.0	...	1.3	257
Netherlands	64,620	6,207	10.6	0.6	1.1	464
Norway	63,000	5,647	9.8	0.6	2.6	19
Portugal	6,765	451	7.1	...	0.1	155
Roumania	15,000	812	5.7	0.1	0.2	137
Russia	150,850	20,377	15.6	1.3	0.1	67
Servia	2,635	1,075	68.9	...	0.1	155
Spain	25,000	196	0.8	0.2	0.13	99
Sweden	187,441	13,386	7.7	1.6	3.4	32
Switzerland	78,736	4,978	6.7	0.7	2.1	236
Total	2,966,553	265,225	9.8	26.3	0.7	119
South America	85,744	13,642	18.9	0.8	0.2	6.5
All other countries	339,285	92,671	37.6	3.0	0.03	28
Total world	11,271,893	1,016,968	9.9	100.0	0.6	30

The table shows, that, as in former years, the German Empire and Great Britain remain the leaders in European telephone development, the German Empire having about 36 per cent and Great Britain 22 per cent of all European telephones. Of the remaining countries, only one, France, exceeds 200,000 telephones, and only three others—Austria, Russia and Sweden—have over 100,000 telephones each. The combined number of telephones in six important European States—Belgium, Norway, Denmark, Hungary, Italy, and the Netherlands—is still less than the number of telephones in New York City, while Chicago has more telephones than France, and Boston more than Austria; the three Scandinavian kingdoms combined do not equal the total number of telephones in New York City by about 57,000.



TELEPHONES PER 100 POPULATION, JANUARY 1, 1911.



Distribution of the World's Telephones, January 1, 1912, 12,453,000 (Partly Estimated).

The accompanying chart presents graphically the statistics shown in previous table in the column "Telephones per 100 Population." Despite considerable activity in some European countries, the relative positions have not changed during the past year. Denmark still leads Sweden by a small margin. As the average for Europe January 1, 1911, was 0.7 telephones per 100 population, the development of the United States at the same date—8.1 per 100 population—was almost twelve times that of Europe. South America advanced to 0.2 telephones per 100, and Canada to 3.7, or more than five times the development of Europe.

Looking at the telephone development from the point of population per station, it appears that the United States January 1, 1911, averaged one station to each 12 inhabitants, as against the European average of one to 148. Of the European states, Denmark and Sweden are about equal, the former having one station to every 28, and the latter one station to every 29 inhabitants. The German Empire and Great Britain have about twice, France six times and Austria eight times the population per station of Sweden.

A more comprehensive view of the relation between

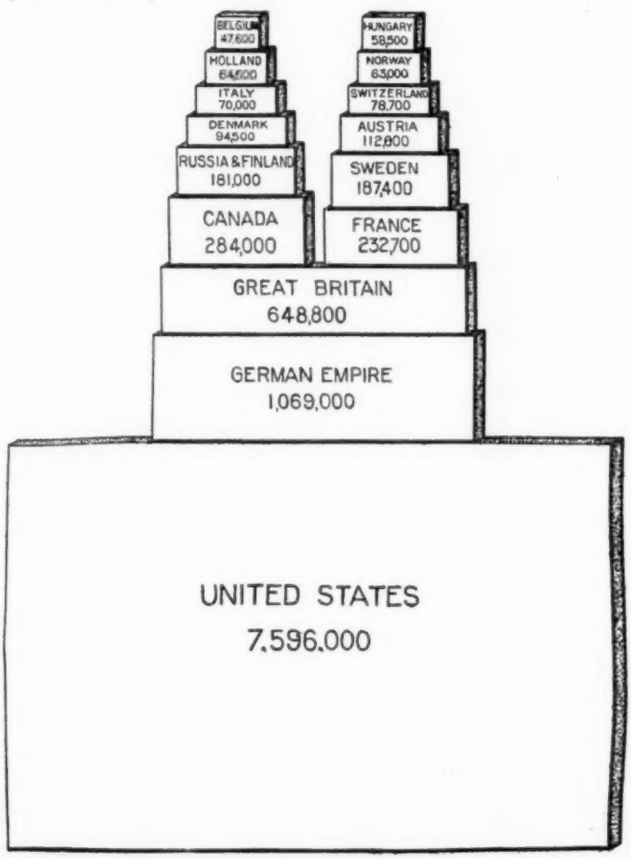
telephone development and population is gained from another chart shown. This chart compares European countries, the United States and Canada, representing in each case both population per square mile and telephones per 100 population. The greatest population per square mile is found in Belgium, which has 663 inhabitants to the square mile, and the largest number of telephones per 100 population is found in the United States, which January 1, 1911, had 8.1 telephones per 100 population.

It is evident from the chart that Canada has by far the lowest density of population; next comes South America and then Norway, while Sweden is about equal to the United States, and Italy to Germany. In telephone development Canada ranks next to the United States. Denmark and Sweden, which have about the same development, are still considerably below one-half the telephone development of the United States.

Passing from the general survey of telephone development of the various countries of the world, it is interesting to note the development of the large cities of Europe and the United States as shown in another chart here. For further analysis the cities are divided into five groups, i. e.:

Group I—Cities with population above 800,000.
Group II—Cities with population from 350,000 to 800,000.
Group III—Cities with population from 200,000 to 350,000.
Group IV—Cities with population from 125,000 to 200,000.
Group V—Cities with population from 100,000 to 125,000.

Groups of Cities.	January 1, 1911. No. of Cities. U. S.	Europe.	Population U. S.	Europe.	Number of Telephones. U. S.	Europe.	Telephones Per 100 Pop. U. S.	Europe.
I. Over 800,000	4	14	10,009,000	25,292,000	907,823	721,381	9.0	2.8
II. 350,000-800,000	12	31	6,190,000	15,390,000	634,614	358,365	10.2	2.3
III. 200,000-350,000	14	43	3,656,000	11,212,000	488,716	341,543	13.3	3.0
IV. 125,000-200,000	16	46	2,401,000	7,224,000	251,332	157,630	10.5	2.2
V. 100,000-125,000	18	25	1,969,500	2,814,000	213,254	67,389	10.8	2.4
Total cities	64	159	24,225,500	61,932,000	2,495,739	1,646,308	10.3	2.6
Entire Country	..	...	93,104,000	437,861,000	7,595,938	2,966,553	8.1	0.7
Ratio of Cities to Entire Country	..	...	26%	14%	33%	55%	...	...



Telephone Development of the World, January 1, 1911.

Third: In Europe 14 per cent of the total population and 55 per cent of the total telephones are found in 159 cities.

Fourth: In the United States 26 per cent of the total population and 33 per cent of the total telephones are found in 64 cities.

The most salient feature of the table is, however, the disparity in the figures showing average city developments: 2.6 for Europe, and 10.3 for the United States. Moreover, although the 159 European cities have about 260 per cent of the population of the 64 United States cities, yet they have but 66 per cent of the telephones in the 64 United States cities.

Referring to Group III (200,000 to 350,000 population) we find the 43 European cities do not have one-fourth the telephones per 100 population of the 14 United States cities. Again, referring to Groups IV and V, the 71 European cities had but 50 per cent of the telephones of the 34 United States cities.

The chart opposite also demonstrates that Europe has but one highly developed city (Stockholm) with 19.9 telephones per 100 population. Indeed, there are only thirteen cities with over 100,000 population in Europe with five or more telephones per 100 population. The great majority of European cities have only from one to three telephones per 100 population, while 25 cities have less than one. Furthermore, there are at present three large cities in Europe having no telephone development whatever, Constantinople, Adrianople and Saloniki.

The subsequent table reviews the development of nine large European cities for sixteen years, and the chart following compares five of these cities with five United States cities. Excepting Stockholm, none of the European cities has reached the development of New York, while the highest development in the United States is 4.1 points above the corresponding highest development in Europe. Neither London, Paris, Vienna, nor St. Petersburg have reached a development of three telephones per 100 population. Berlin and Hamburg are

5.3 and 4.7 respectively, and Christiania and Copenhagen, with 6.9 and 7.0, respectively, are about equally developed.

Cities.	Telephones Per 100 Population — Jan. 1, 1895.	Jan. 1, 1900.	Jan. 1, 1905.	Jan. 1, 1910.	Jan. 1, 1911.
Europe—					
Stockholm	4.1	9.7	13.6	18.5	19.9
Copenhagen	1.2	3.0	4.9	6.7	7.0
Christiania	3.0	5.4	5.4	6.7	6.9
Berlin	1.6	2.3	3.5	5.1	5.3
Hamburg-Altona	1.5	2.2	3.6	4.6	4.7
London	0.2	0.6	1.4	2.5	2.8
Paris	0.7	1.2	1.8	2.5	2.7
Vienna	0.5	0.8	1.2	2.1	2.3
St. Petersburg	0.2	0.3	0.6	1.9	2.2
United States—					
Los Angeles	2.0	5.7	14.1	23.1	24.0
Chicago	0.8	1.3	4.9	9.8	11.0
Boston	1.0	2.3	4.8	8.6	9.2
Philadelphia	0.3	0.9	4.6	7.9	8.6
New York	0.6	1.4	4.6	7.6	8.3

In actual number of telephones, January 1, 1911, Berlin, London and Paris, with a combined total of 403,500 telephones, are about even with New York (402,000). The latter approximates very nearly the combined telephones of 14 European states.

WIRE MILEAGE.

The next statistical table (also chart) view the telephone development of the world in point of wire plant January 1, 1911. At this date the grand total of telephone wire mileage was about 27,000,000, of which the United States possessed 61.7 per cent. Europe 32.5 per cent, Canada 2.6 per cent, South America 0.5 per cent, and all other countries 2.7 per cent. Thus the United States has almost twice the total telephone wire of all Europe. The German Empire, though possessing the largest number of telephones of any of the European states, has but one-fifth the telephone wire of the United States, and Great Britain but one-eighth.

Division.	Miles of Wire Jan. 1, 1911.	Increase during 1910. Miles.	%	Per cent of Total Jan. 1, 1911.
United States	16,633,590	1,383,141	9.0	61.7
Canada	709,708	102,960	16.9	2.6
Europe—				
Austria	287,523	31,179	12.1	1.0
Belgium	147,252	9,076	6.5	0.6
Bosnia	1,403	95	7.2	...
Bulgaria	5,762	523	10.0	...
Denmark	254,989	29,837	13.2	0.9
Finland	76,793	6,982	10.0	0.3
France	831,169	93,527	12.7	3.0
German Empire	3,553,504	329,027	10.2	13.2
Great Britain	2,116,368	91,420	4.5	7.9
Greece	5,323	1,064	24.0	...
Hungary	201,636	22,604	12.6	0.8
Italy	161,628	14,693	10.0	0.6
Luxembourg	3,612	62	1.7	...
Netherlands	141,478	19,082	15.6	0.5
Norway	129,168	8,383	6.9	0.5
Portugal	21,114	1,858	9.6	...
Roumania	45,333	4,175	10.0	...
Russia	260,049	18,630	7.7	1.0
Servia	8,045	678	9.2	...
Spain	54,027	4,806	9.8	...
Sweden	245,757	23,108	10.4	0.9
Switzerland	210,032	9,192	4.5	0.8
Total	8,761,965	719,999	8.9	32.5
South America	136,676	.....	...	0.5
All other countries	720,168	.....	...	2.7
Total world	26,962,107	2,384,653	9.7	100.0

The following table shows the estimated total length of telephone and telegraph wires January 1, 1911, including railroad, telephone and telegraph wire.

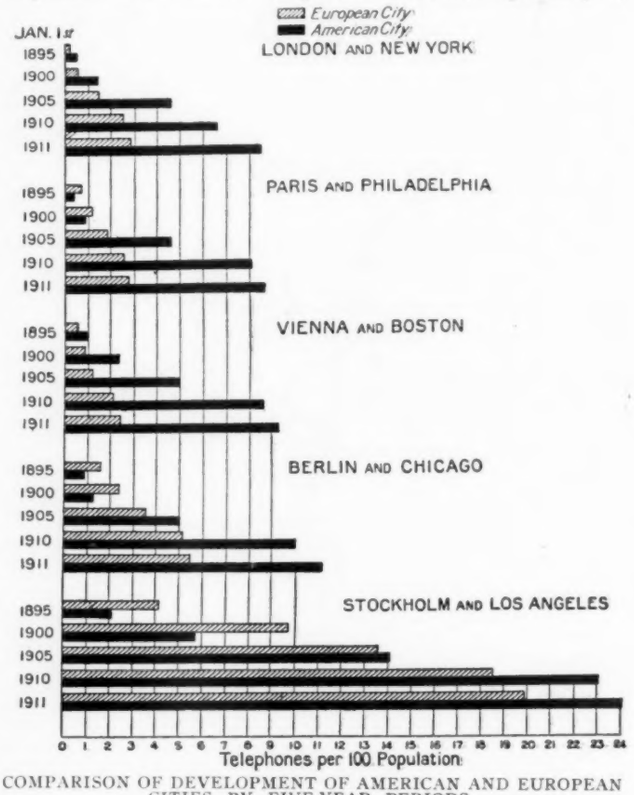
The statistics place the total length of telephone and telegraph wires in the world January 1, 1911, at 34,500,000 miles. Of this total, telephone wire took 78 per cent, telegraph wire (including cables) 17 per cent, and railroad telegraph wire 5 per cent. Again, the United States took 62 per cent of the total telephone wire, and 34 per cent of the total telegraph wire (excluding cables and railroad telegraph wire).

LENGTH OF WORLD'S TELEPHONE AND TELEGRAPH WIRE.
(Partly Estimated.)
JANUARY 1, 1911.

	Miles.	
Telephone Wire:		
United States	16,634,000	
Canada	709,000	
Europe	8,762,000	
All other countries	857,000	
	26,962,000	
U. S. Railroad Telephone Wire	120,000	
Total telephone wire		27,082,000
Telegraph Wire:		
United States	1,849,000	
Canada	153,000	
Europe	2,352,000	
All other countries	1,090,000	
	5,444,000	
Submarine Telegraph Wire (in cables)	314,000	
Railroad Telegraph Wire	1,726,000	
Total Telegraph Wire		7,484,000
Grand Total		34,566,000

TELEPHONE INVESTMENT.

The statistics referring to investment do not always represent the actual replacement values of the various telephone plants, as such information is not recorded by the majority of foreign telephone administrations. The only data available in many cases are the aggregate amounts that have been put into the business since its inception. The world's telephone investment January 1,



COMPARISON OF DEVELOPMENT OF AMERICAN AND EUROPEAN CITIES BY FIVE-YEAR PERIODS.

1911, is estimated at $1,561,800,000, equivalent to $139 per telephone. This total investment is thus approximately equal to the value of the corn crop of the United States in 1911.

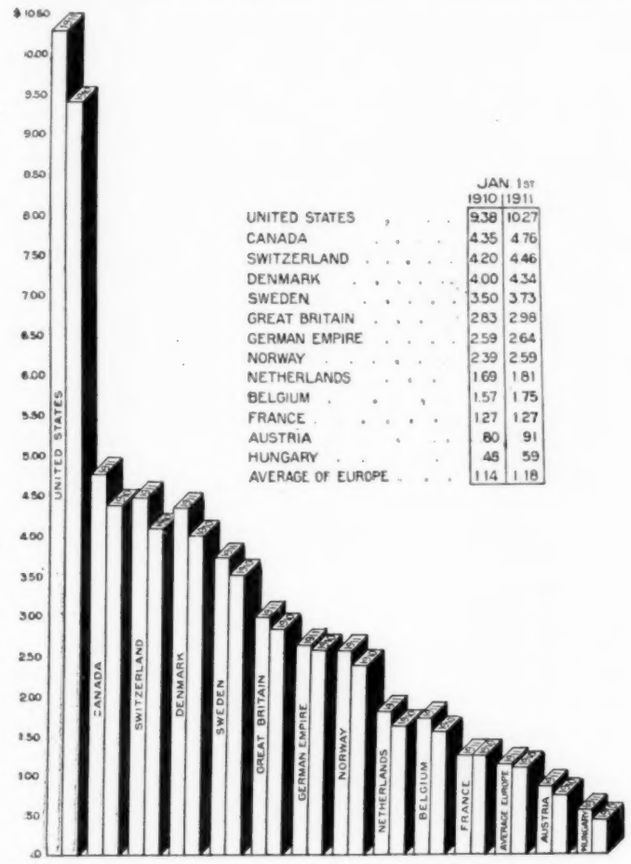
The subjoined table gives the estimated telephone investment of the world January 1, 1911:

Division.	January 1, 1911. Investment.	Per cent of Total.
United States	$ 956,700,000	61.2%
Canada	36,700,000	2.4%
Europe	518,400,000	33.2%
All other countries	50,000,000	3.2%
Total	$1,561,800,000	100.0%

Figured on the respective number of telephones at the same date, the investment per telephone is:

United States	$126
Canada	129
Europe	175
All other countries	118
Total world	139

The investment representing "all other countries" includes $16,456,000 for the Commonwealth of Australia



	JAN. 1st 1910	1911
UNITED STATES	9.38	10.27
CANADA	4.35	4.76
SWITZERLAND	4.20	4.46
DENMARK	4.00	4.34
SWEDEN	3.50	3.73
GREAT BRITAIN	2.83	2.98
GERMAN EMPIRE	2.59	2.64
NORWAY	2.39	2.59
NETHERLANDS	1.69	1.81
BELGIUM	1.57	1.75
FRANCE	1.27	1.27
AUSTRIA	.80	.91
HUNGARY	.48	.59
AVERAGE OF EUROPE	1.14	1.18

TELEPHONE INVESTMENT PER CAPITA FOR UNITED STATES, CANADA AND EUROPE.

and New Zealand, $4,795,000 for the Union of South Africa, $15,223,000 for Japan, and about $6,668,000 for Brazil and Chili together.

During the year 1910, $145,500,000 was added to the telephone investment of the world, so that the above total of $1,561,800,000 represents an increase of 10 per cent over the corresponding investment January 1, 1910. In the United States alone, the estimated increase in investment during 1910 amounted to $97,600,000, or, excluding Europe, considerably more than the total cost of all telephone plants in service in the entire world.

In regard to the more detailed investment statistics given in the following column, perhaps the most striking feature of the table is the high figure for investment per telephone in many of the important European states. For instance, Austria, Belgium, France, Great Britain, Hungary, Spain and Switzerland all show an investment per telephone of over $200.

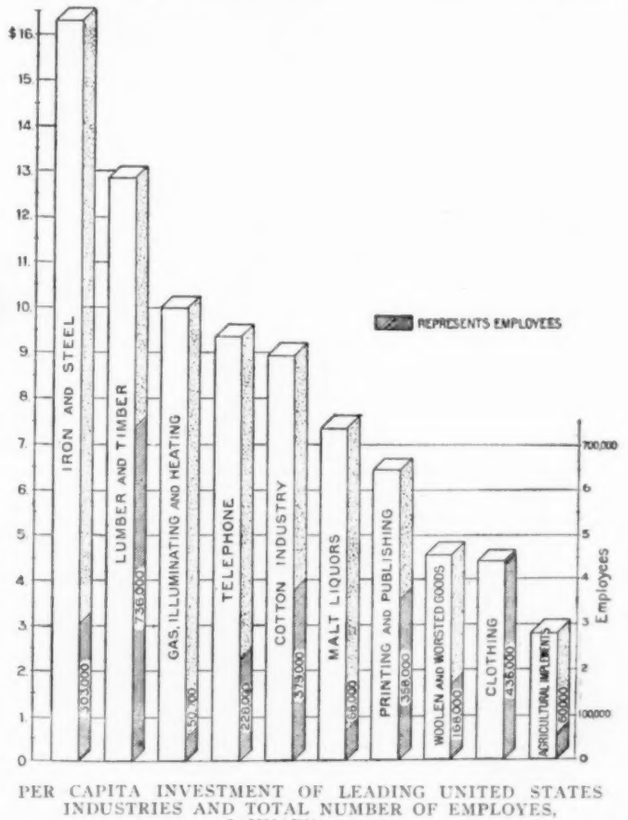
The German Empire, Great Britain, and France combined have slightly more than two-thirds the entire telephone investment of Europe.

TELEPHONE INVESTMENT OF THE WORLD, JANUARY 1, 1911.

Division.	Investment.	Investment—% of Total.	Investment—per 'Phone.	Investment—per Capita. 1910.	Investment—per Capita. 1911.
United States	$ 956,700,000	61.2	$126	$9.38	$10.27
Canada	36,700,000	2.4	129	4.33	4.76
Europe—					
Austria	26,200,000	1.7	233	.80	.91
Belgium	13,195,000	0.9	277	1.57	1.75
Bosnia	245,000	..	328	0.07	0.13
Bulgaria	400,000	...	174	0.09	0.09
Denmark	11,713,000	0.8	124	4.00	4.34
Finland	2,246,000	0.2	74	0.69	0.72
France	50,000,000	3.2	215	1.27	1.27
German Empire	171,304,000	11.0	160	2.59	2.64
Great Britain	134,410,000	8.5	207	2.83	2.98
Greece	200,000	..	112	0.08	0.08
Hungary	12,400,000	0.8	212	0.48	0.59
Italy	9,600,000	0.6	137	0.28	0.28
Luxembourg	629,000	..	189	2.37	2.46
Netherlands	10,798,000	0.7	167	1.69	1.81
Norway	6,214,000	0.4	99	2.39	2.59
Portugal	1,174,000	0.1	174	0.20	0.22
Roumania	2,583,000	0.2	172	0.29	0.36
Russia	18,950,000	1.1	126	0.14	0.14
Servia	600,000	..	228	0.21	0.20
Spain	8,100,000	0.5	324	0.45	0.43
Sweden	20,619,000	1.3	110	3.50	3.73
Switzerland	16,797,000	1.1	213	4.20	4.46
Total	$ 518,377,000	33.2	$175	$1.14	$1.18
All other countries	$ 50,000,000	3.2	$118	$....	$....
Total world	$1,561,777,000	100.0	$139	$....	$....

Excepting the German Empire and Great Britain, none of the European states exceeds $100,000,000, and the majority have invested less than $20,000,000 apiece. Of the Scandinavian kingdoms, Sweden has approximately twice the investment of Denmark, which in turn has about twice that of Norway.

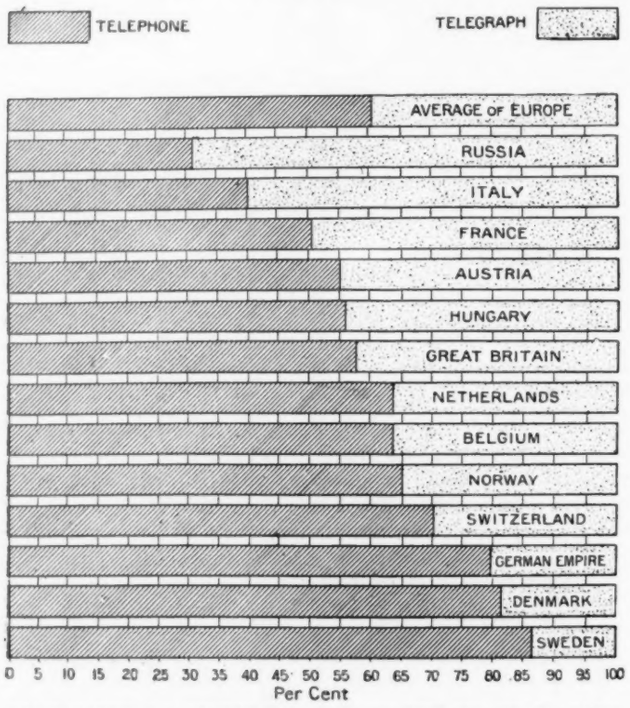
Viewing telephone investment from a per capita



PER CAPITA INVESTMENT OF LEADING UNITED STATES INDUSTRIES AND TOTAL NUMBER OF EMPLOYES, JANUARY 1, 1910.

basis, a very different situation is revealed. A glance at the chart herewith shows that of the European countries Switzerland leads, and Denmark has advanced to second position; on the other hand, though the German Empire

occupied first rank in point of total investment, it takes fifth place in point of investment per capita. The per capita investment of the United States ($10.27) is about nine times that of Europe ($1.18). Of the European



COMPARISON OF TELEGRAPH AND TELEPHONE GROSS EARNINGS PER CENT OF EACH TO TOTAL IN EUROPEAN COUNTRIES, 1909.

countries shown on the chart, Hungary has the lowest per capita investment ($0.59), and Austria has not yet reached an investment of $1.00 per capita.

4. INVESTMENT—TELEPHONE AND TELEGRAPH.

It is interesting to compare the telephone investment of the world with that of the telegraph (including submarine cables). In the absence of any definite information covering the entire world on that subject, only an estimate can be made. Using the total telegraph wire mileage, January 1, 1911, as a basis, the telegraph investment may be estimated at about $700,000,000. There are also 314,000 miles of submarine cable representing an estimated investment of $350,000,000, so that the total telegraph investment of the world January 1, 1911, may be placed at $1,050,000,000, as compared with a telephone investment of $1,561,777,000 at the same date.

World—Jan. 1, 1911.	Investment	Per cent
Telephone	$1,561,777,000	60
Telegraph	707,720,000	27
Cable	350,000,000	13
Total	$2,619,497,000	100

5. EARNINGS FOR 1909—TELEPHONE AND TELEGRAPH.

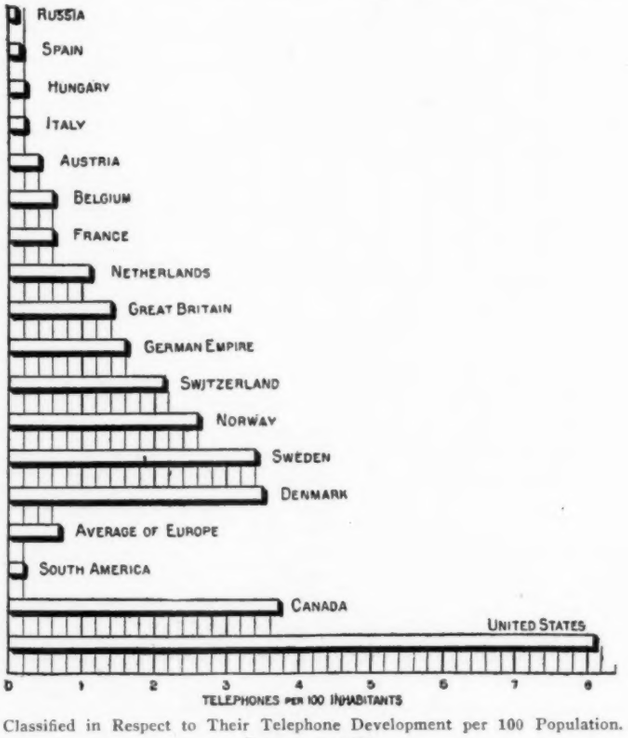
The figures for gross telephone earnings in European countries are official, but those quoted for "all other countries" are mostly estimated. The total gross telephone earnings of the world for the year 1909 may be placed at $329,000,000, of which the United States earned $221,471,000 (67.4 per cent), Canada $6,752,000 (2 per cent), Europe $91,331,000 (27.8 per cent), and all other countries $9,163,500 (2.8 per cent).

The following table shows the gross telephone earnings of the various European countries, ranging from $241,000 (Portugal) to $32,331,000 (German Empire). The average earning per telephone for total Europe was $35.40.

TELEPHONE GROSS EARNINGS OF THE UNITED STATES, CANADA, EUROPE AND ALL OTHER COUNTRIES YEAR 1909.
(Partly Estimated.)

Division—	Gross earnings	Per cent to total earnings	Increase during 1909	Average earnings per 'phone
United States	$221,471,000	67.4	$20,881,000	$32.87
Canada	$ 6,752,032	2.0	$ 1,161,000	$31.87
Europe—				
Austria	$ 3,704,990	1.1	$ 584,000	$41.45
Belgium	2,066,740	0.6	152,000	50.75
Bosnia	11,555	..	1,900	21.90
Bulgaria	65,135	..	7,000	31.65
Denmark	2,040,158	0.6	233,000	24.45
Finland	448,518	..	.....	15.95
France	8,161,600	2.4	1,098,000	40.20
German empire	32,330,909	9.8	3,407,000	35.00
Great Britain	23,113,326	7.0	1,858,000	39.40
Greece	37,048	..	4,000	26.40
Hungary	1,859,205	0.6	155,000	38.85
Italy	2,416,902	0.8	348,000	42.70
Luxembourg	62,697	..	6,000	20.80
Netherlands	1,731,700	0.5	244,000	32.45
Norway	1,159,864	0.8	40,000	21.35
Portugal	240,516	..	10,000	40.90
Roumania	277,947	..	35,000	22.50
Russia	4,756,475	1.4	469,700	39.00
Servia	58,575	..	4,000	37.65
Spain	831,125	..	38,000	35.20
Sweden	3,959,765	1.2	309,000	23.60
Switzerland	1,996,439	0.6	169,000	27.95
Total	$ 91,331,189	27.8	$ 9,172,600	$35.40
All other countries	$ 9,163,500	2.8	$.....	$30.00
Total world	$328,717,721	100.0	$.....	$.....

On account of the almost universal custom of European governments of conducting the telephone as a



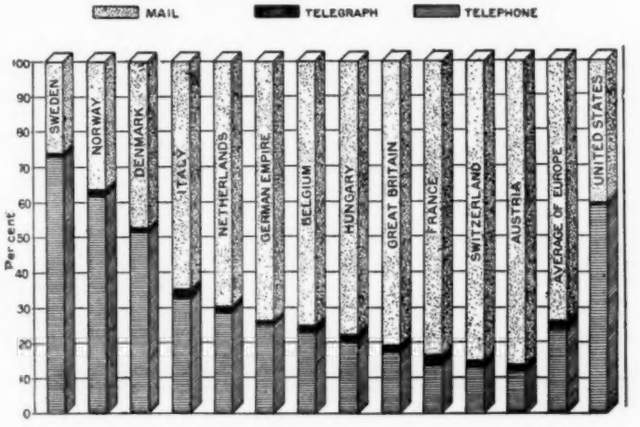
Classified in Respect to Their Telephone Development per 100 Population. January 1, 1911.

branch of the postal and telegraph services, practically no European government keeps its accounts in such a manner as to reveal the true net financial result of its telephone service.

The following statistical table summarizes the gross

telephone and telegraph earnings of Europe, as illustrated by the chart on the opposite page. It is estimated that in Europe the gross telegraph earnings are about two-thirds of the gross telephone earnings, while in the United

COUNTRY	PER CENT OF TOTAL MESSAGES		
	TELEPHONE	TELEGRAPH	MAIL
SWEDEN	72.6	0.7	26.5
NORWAY	61.9	1.5	36.6
DENMARK	51.9	1.0	47.1
ITALY	32.1	3.1	64.8
NETHERLANDS	28.5	1.8	69.7
GERMAN EMPIRE	25.4	0.9	73.7
BELGIUM	22.6	1.8	75.4
HUNGARY	20.4	1.8	77.8
GREAT BRITAIN	17.7	1.8	80.5
FRANCE	13.8	3.4	82.8
SWITZERLAND	13.5	1.5	85.0
AUSTRIA	12.9	1.2	85.9
AVERAGE OF EUROPE	25.9	1.7	72.4
UNITED STATES	58.7	.4	40.9



RATIO OF MAIL, TELEGRAPH AND TELEPHONE MESSAGES, YEAR, 1909.

States they are about one-fifth of the gross telephone earnings.

Referring only to the larger European states, this statistical table reveals the fact that in most of the European countries gross telephone earnings are substantially larger than gross telegraph earnings. Indeed, telephone earnings are over twice as large as telegraph earnings in four countries; in Switzerland they are two and a half times as large, in Germany and Denmark they are four times as large, and in Sweden, they are over six times as large. In three countries, on the other hand, telegraph earnings still exceed telephone earnings. These countries are Italy, Spain and Russia—in the last two countries telegraph earnings are over twice telephone earnings. Finally, it is noteworthy that in France telegraph earnings nearly equal telephone earnings.

COMPARISON OF THE GROSS TELEPHONE AND TELEGRAPH EARNINGS OF EUROPEAN COUNTRIES FOR 1909.

Country—	Gross Telephone Earnings	Gross Telegraph Earnings	Total Earnings	Per cent of Total Gross earnings tele-phone	Per cent of Total Gross earnings tele-graph
Austria	$ 3,704,990	$ 3,162,571	$ 6,867,561	54	46
Belgium	2,066,740	1,191,450	3,258,190	63	37
Bosnia	11,555	281,324	292,879	4	96
Bulgaria	65,135	294,610	359,745	18	82
Denmark	2,040,158	488,697	2,528,855	81	19
France	8,161,600	8,101,828	16,263,428	50	50
German Empire	32,330,909	8,771,920	41,102,829	79	21
Great Britain	23,113,326	15,960,869	39,074,195	59	41
Greece	37,048	346,794	383,842	10	90
Hungary	1,859,205	1,491,079	3,350,284	55	45
Italy	2,416,902	3,820,513	6,237,415	39	61
Luxembourg	62,697	16,338	79,035	79	21
Netherlands	1,731,700	1,011,475	2,743,175	63	37
Norway	1,159,864	642,875	1,802,739	64	36
Portugal	240,516	849,862	1,090,378	22	78
Roumania	277,947	595,106	873,053	32	68
Russia and Finland	5,204,993	12,408,158	17,613,151	30	70
Servia	58,575	120,823	179,398	33	67
Spain	831,125	2,032,422	2,863,547	29	71
Sweden	3,959,765	615,049	4,574,814	86	14
Switzerland	1,996,439	812,561	2,809,100	71	29
Total Europe	$91,331,189	$63,016,424	$154,347,613	59	41

6. TRAFFIC—MAIL, TELEGRAPH AND TELEPHONE.

Instructive as it would be to compare the traffic of the other two branches of transmission of intelligence—the mail and the telegraph—with the telephone traffic of the world, such a comparison would only be speculative on account of the lack of statistical material. There is, however, sufficient statistical information to permit a comparison of the traffic of these three services, both in the United States and in Europe, during the year 1909. The result is as follows:

EUROPE.

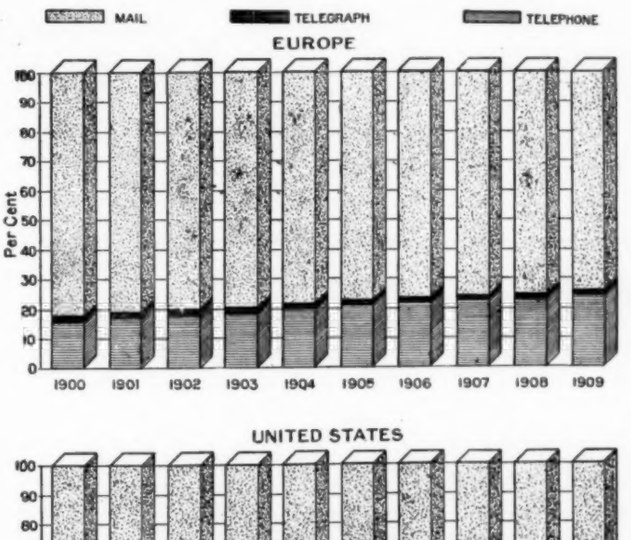
Type of message—	No. during 1909	Per cent of total Europe
First class mail matter	15,387,000,000	74.4
Telegrams	345,000,000	1.7
Telephone conversations	4,937,000,000	23.9
Total	20,669,000,000	100.0

UNITED STATES.

Type of message—	No. during 1909	Per cent of total Europe
First class mail matter	8,793,000,000	40.9
Telegrams	98,000,000	0.4
Telephone conversations	12,617,000,000	58.7
Total	21,508,000,000	100.0

The figures show that although Europe has about three and a half times the telegraph traffic and nearly twice the first-class mail traffic, it has only one-third the telephone traffic of the United States.

The next table shows the first-class mail, telegraph



RATIO OF MAIL, TELEGRAPH AND TELEPHONE MESSAGES. EUROPE AND UNITED STATES, 1900 TO 1909.

and telephone traffic per 1,000 population for Europe and the United States during 1908 and 1909.

EUROPE.

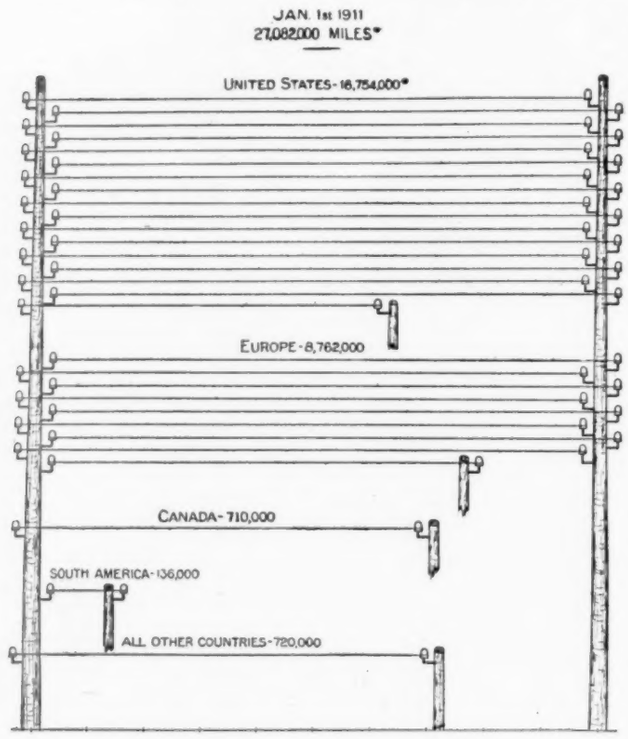
Type of message—	1909	1908	Per cent Increase
First class mail matter	35,533	34,766	2.2
Telegrams	798	769	3.7
Telephone conversations	11,400	10,585	7.7

UNITED STATES.

Type of message—	1909	1908	Per cent Increase
First class mail matter	96,090	90,062	6.7
Telegrams	1,076	1,039	3.5
Telephone conversations	137,882	134,335	2.6

7. A COMPARISON WITH OTHER INDUSTRIES.

The magnitude of the United States telephone investment per capita may be emphasized by comparing the



TELEPHONE WIRE MILEAGE OF THE WORLD, JANUARY 1, 1911. 27,082,000 MILES.

telephone with some of the other leading United States industries. Such a comparison is based on recent special reports by the United States Census Office, publishing the requisite data as of January 1, 1910. The chart on page 123 gives the result of a comparison of the telephone business with ten large United States industries. Despite the fact that the telephone has been in use but thirty-five years, the telephone investment per capita January 1, 1910, is the fourth largest, yielding only to the iron and steel, lumber and gas and heating industries.

Telephone System Grows in Alberta

Official announcement has been made by W. H. Harmer, deputy minister of railways and telephones for the Province of Alberta, in Edmonton, that the government telephone construction program, including the stringing of more than 1,500 miles of main lines and the installation of several thousand instruments, will be completed before the end of the year. Twelve hundred men are at work in the various districts. The new copper circuit between Edmonton and Calgary, 198 miles, will be completed early in September and the department will be in a position to handle the business between the two cities for several years to come. Three direct circuits will be in use between Edmonton and Calgary, two of these being copper circuits and the third a "phantom" circuit, formed by the combination of the other two lines.

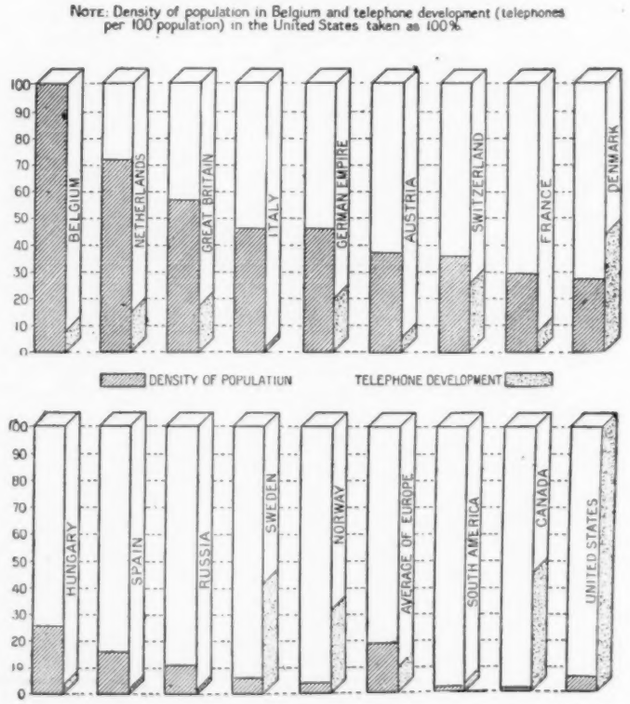
Mr. Harmer says also that since opening the lines radiating from Edmonton the first of the year business has increased more than forty per cent. The increase has been most marked between Edmonton and Calgary, and the long-distance telephone has become popular in business and agricultural communities. The new circuit from Edmonton to Athabasca Landing, ninety miles, is nearing completion and before fall is far advanced the new service will be in use.

Other lines which will greatly improve the service between the large and small towns of northern Alberta are being rushed.

The new line from Carmangay to Lethbridge, eighty-seven miles, was opened recently, giving a second circuit between the two points.

Employees of Bell to Be Insured

Over 200,000 employees of the Western Union Telegraph Company and the American Telegraph and Telephone Company are to become, without expense to themselves, beneficiaries in a life, accident and disability insurance project which Theodore N. Vail, president of these companies, will put into operation this fall. The two companies are automatically to insure their workers after a short term of continuous service. "There are more than 200,000 persons at work for the corporations of which I am the active head and I purpose to aid in the establishment this fall of an insurance system that will make the prospect of want unknown among them," says Mr. Vail. "This can be done without loss to the employer, who gains infinitely in the improved quality and the greater quantity of service which the contented employee renders."



COMPARISON OF DENSITY OF POPULATION AND TELEPHONE DEVELOPMENT, JANUARY 1, 1911.

Digest of Foreign Telephone Literature

Translated for Our Readers

RELATION BETWEEN TELEPHONE SERVICE AND CURRENT CONSUMPTION.

IT IS often of interest to the manager of a telephone exchange to know the relation between service and current consumption, and the present article will show the relations between the number of connections and operators as compared to the current consumption.

In trying to operate an exchange in the most economical way, it is desirable to know how many connections are made simultaneously and how many operators must be at the switchboard, so that there shall be no idle operators and yet enough operators to give quick service. The thought came to the writer, a telephone engineer of Leipzig, that there might be a certain relation between the number of calls received and the amount of current used. To ascertain the correctness of this hypothesis, the current consumption was determined every hour in terms of amperes, and at the same time the number of connections made by the different operators was recorded. Connections included not only the completed connections, but also those about to be made, and calls received. The curves plotted as a result of the test show a gradual increase of the number of calls from 8 o'clock on. These reach their height at 10 and 12 o'clock, drop down to a very low figure at 2 and rise again at 4 o'clock. Up to 6 o'clock service keeps at about the same level, and decreases after that very rapidly. A comparison of this curve with the curve for current consumption shows a great degree of similarity between them, so that the supposition of a relation between the two elements seems to be certain. The hours with the least number of calls show the greatest variations in curves. The current consumption is heavier than the consumption for heavy service later in the day, as might well be expected from the number of calls made simultaneously. This may be due to the fact that the storage batteries furnish current for other uses as long distance connections, feeding of call lamps, series connections, substation service, etc. The amount of current used for these purposes, is however, relatively small, and has no effect on the curve, as soon as the number of calls increases. It must also be remembered in regard to the accuracy of the test, that it is very difficult to count the number of calls made simultaneously at any switchboard, as it varies constantly. This shows more with the small number of calls, of course, than with the large number. As the service increases, the similarity of curves for the two factors becomes very apparent, and the change in amperes is but slight. At 9 o'clock, for example, 53 amperes were used for 538 connections; at 10 o'clock 62 amperes for 630 connections; at 12 o'clock 60 amperes for 590 calls, and at 5 p. m. 53 amperes for 550 calls. This shows that the current consumption is an indicator for the number of calls received and answered, provided some standards of equivalents are determined. To determine how much of a correction would have to be made for other service, not classed directly under connections, the current was measured at the various switchboards. The amperage consumption at the different switchboards for purposes only indirectly associated with calls, is about 12 amperes when service is heaviest. At 12 o'clock, for example, 60 amperes were measured at the switchboard. Allowing for correction, we have $60-12=48$ amperes current used for connections proper. Measurements showed that a connection takes about 0.08 amperes current, considering call received, connection made, lighting up of call lamp, and use of call bell current as a complete connection. Taking this current consumption of 48 amperes and dividing by current per call, or $48 \div 0.08 = 600$ connections. Verifying this theoretical result from the curve, it was found that 590 calls were received and answered, which is close enough for ordinary purposes.

To test the correctness of this assumption, for a longer period, tests were made extending over periods of 4 and 6 days, and curves plotted for the average current consumption and number of connections in the ten days. The curves for both factors were almost identical, showing a close relation between them.

The Leipzig exchange shows the maximum number of connections at any given moment to be 630, *i. e.*, when service was heaviest. Since the exchange has 16,000 call lines, the number of connections is only equal to 3.9 per cent of the trunk lines at the exchange. This proves that the growth of an exchange is not accompanied by an increase in connections made at any one time, but that this latter figure decreases in a certain ratio. This fact is important in view of the projected change from manual to semi-automatic service next year. The semi-automatic or automatic service will reduce this number still further, since the connections are automatically broken, as soon as the two subscribers have finished their conversation, which is not always the case in manual service, especially during the periods of heavy service. Here there are often quite a number of connections that ought to have been broken, but were counted in with the maximum figure of 630.

The curves plotted in this test, finally, may serve as a good basis for arranging the operators' time, and switchboard service during the different hours of the day. This is feasible, since, as was shown, the number of calls received is proportional to the current consumption. If, during heavy service periods all of the switchboards were to have one operator (at present in the Leipzig exchange a total of 100) we would have at say 2 o'clock, $\frac{260 \times 100}{630} = 41$ operators, to give proper service. Since there are fluctuations from this figure, and since allowances must be made for sickness, arrangements should be made for 48 operators during the hour from, say, 1:30 to 2:30 P. M. Similar estimates can be made for the rest of the day, basing the results on the current consumption and number of calls made simultaneously at any time in the day.—*F. Ambrosius, in the Elektrotechnische Zeitschrift.*

ALUMINUM VS. COPPER FOR TELEPHONE LINES.

Germany, contrary to France and America, uses very little aluminum for telephone and electric transmission lines, chiefly because, as German telephone engineers

claim, too little is known about aluminum, and the sag of this type of wire is so great as to increase costs beyond an economical limit. The recent completion of the high power transmission line of Rjukaufos project in Norway showed that aluminum gives good service, and is in many respects better than copper. Here aluminum was used for long spans, and is exposed to very severe weather conditions. The reason for choosing the aluminum for this line will be discussed later. The objection laid against aluminum is mainly expressed in the supposition that thin wires are not able to stand as great a snow load as heavier wires, and that aluminum wire especially would not meet the severe conditions of winter. On the other hand, statements have frequently been made that thin wires never show as heavy a load of snow or ice as thick wires, and if this is borne out by facts, it would eliminate the above objection to aluminum. Observations made in Norway show, however, that the 4 millimeter telephone wires, and the 300 square millimeter aluminum cables receive equally heavy loads of ice and snow. The disadvantage of the thin wire is at once apparent, for the sag of these was so great that in many instances the wires broke. It may be true that thinner layers of ice may cling to the tnin wires, but the engineer has to allow for the worst possible case, when making computations, and cannot take the most favorable conditions as standard. That heavier cables withstand snow loads, plus wind pressure, better than thin lines, is proved by the numerous breakdowns of telephone and telegraph wires each winter as against the less frequent breaking of thick aluminum cables.

An example may explain this more fully. Compare 50 square millimeters (0.08 square inches) copper wire to 85 square millimeters (0.136 square inches) aluminum wire, the two being equivalent from the viewpoint of efficient service. Smaller cross sections for aluminum are not advisable. The permissible stress for copper is 25,560 pounds per square inch, which is equivalent to a tensile strength of 56,800 pounds per square inch. Aluminum allows a stress of 12,780 pounds per square inch, according to German electrical standards. The load of ice for copper is about 1.65 pounds, an increase of 2.7 times the dead weight of the wire. The thickness of the ice layer with a specific gravity of 0.2 equals 2.7 inches. For aluminum the same load would be 2.79 pounds, which is equal to an increase of 6.5 times the dead weight of the wires, and an ice thickness of 3.6 inches. At first glance the copper seems to have the better place. But if the same proportional ice load factor is added to the copper it will be seen that aluminum is at least equivalent to the copper wire.

Interesting are the results of investigations made by Norwegian engineers with aluminum for electric conductors. Following are the conclusions based on foreign and home practice, and embodied in a report by the investigating committee.

1. It is not advisable to employ solid aluminum cables, or conductors of small cross section, at least not below 0.08 square inch, and especially not for short spans, where the temperature changes result in large differences in the sag between spans. Such wires have been known to snap off short at the insulators.

2. Aluminum cables of large cross section have proved efficient for long spans. One power station has used 1,200 miles of aluminum cable and has met very little trouble.

3. Injurious chemical effects of the air on the aluminum have not been noticed on lines along the sea coast nor near regions with blast furnaces, mines, and chemical works. On the contrary, it is claimed that aluminum is the only metal which resists the influence of nitric and nitrous gases, such as are found in the waste gases escaping from factory chimneys.

4. Great care must be taken in the overhead line work with aluminum cables and wires, as they are very sensitive to mechanical influences, which would lower the resistance of the wire. It was found that drawing the aluminum into wire, as is done at the wire drawing works, gives the outer layers of wire a greater tensile strength than the inner layers near the center, so that the ratio between loss in tensile strength and cross section is not directly proportional. Consequently aluminum cables should not be allowed to trail over rocky and rough ground, and when drawn over the poles in transmission lines, should preferably be drawn over wooden rollers.

5. Aluminum is very hard to solder and weld, and connections between wires must be made by junction boxes or similar means. It is also advisable to protect the aluminum against excessive and constant friction at any one point from clamps or insulators. Special clamps should be used, which distribute the stresses and friction at any point over a large area.

6. Since the tensile strength of aluminum is only 25,140 pounds per square inch, as against 56,800 pounds per square inch for copper, the sag is greater with a given snow and wind load. Consequently the transmission poles must be higher and are more expensive, which additional cost is not balanced by the smaller weight of the aluminum.

7. The coefficient of heat expansion of aluminum is greater than that of copper, resulting in a greater sag of the former at higher temperatures. The sag is smaller, however, the greater the span, so that long spans are not so much affected by the excessive sag.

8. The elastic limit of the two metals is about the same (0.15 per cent).

9. The breaking limit is, however, much smaller for copper than for aluminum, being 7.4 per cent for the latter and only 3.5 per cent for the former. This is quite important, for, if an excessive load is placed on the wires, stretching the same to the breaking point, the aluminum will sag more and thus have wider limits before the break occurs than the copper cables. Since the specific load decreases rapidly with increasing sag, we have a bigger factor of safety and greater resistance in aluminum wires.

10. The specific electric resistance is 0.017 for copper and 0.029 for aluminum. The cross section for aluminum with the same resistance is therefore to be increased by 70 per cent. In this case the current losses would be equally large for both. The radiating surface is 30 per cent greater for aluminum. Since the differences in surface are of little account, it is obvious that an aluminum line computed for the same current losses as a copper line, cools more rapidly. The heat expansion factor and with it the increase in sag, becomes smaller, and this relation is favored still more by the smaller temperature coefficient of electric resistance in aluminum (0.0039 Al.), as against 0.0043 for copper. Where large cross sections are used, as in aluminum cables, this characteristic of aluminum is of great importance.

The above conclusions show that aluminum has characteristics making it under certain conditions a very economical and efficient current conductor for overhead lines. The question is still an open one and will probably not be settled for some time.—Dr. F. Marguerre in the *Elektrotechnische Zeitschrift and Elektrische Kraftbetriebe.*

IMPORTANT OR HURRY CALLS.

A very interesting discussion was recently started in relation to the question of giving certain telephone calls preference, and if need be, interrupting connections of calls already made. German government regulations permit the interruption of local connections in favor of long distance calls, but no uniform rule has as yet been made as regards local calls. Two conditions must be considered in discussing this question, namely, 1. Calls of great importance to the subscriber who receives the calls. 2. Calls of great importance only to the calling party.

The calls under No. 1 are the really important ones, since they contain information of absolute importance to

the subscriber. Rapid connection with the desired party for transmission of the message is the first essential. Such calls might be figured at a rate three times as high as the ordinary call rate. As regards the interruption of a hurry call connection in favor of a second hurry call, the point might be raised that this interruption may not always be proper. For example, *A* speaks with *B* on important business, *i. e.*, a hurry call, and *C* calls up *A* on a hurry call. The question is, will it be more advantageous to *A* to be interrupted in his talk to *B* and to listen to *C*, or will this call be of no interest to him, although of prime importance to *C*. The solution of this problem is difficult for *A* would probably object very strenuously to have his hurry call to *B* for which he is paying a rate three times the usual one, interrupted at all.

In spite of this doubtful condition of affairs it will hardly be possible to get away from an interruption of calls. From a technical standpoint it is rather difficult to arrange for signals that shall at once show a hurry call to the operator. This is especially plain, if we remember that the hurry call is usually made at a different switchboard from which the busy subscriber's line is desired. The operator receiving the call, can only see that there is a call, cannot tell, however, without very complex apparatus, whether the call is important or not.

The second type of so-called "hurry calls" deals with the calling party who is in a hurry to deliver his message to the other party in the shortest possible time. It may be that he is going on a journey, or some other reason, but the object is to deliver his message without delay, if not to the second party himself, at least to some one who will transmit the same as quickly as possible. Under such conditions it would be wrong to interrupt the call, and it would be sufficient to have some operators at exchanges to receive such messages and transmit them as soon as the recipient's line is open.

The following system has been proposed to settle difficulties of various kinds. The exchange is equipped with one or more switchboards, whose operators are familiar with shorthand. Any subscriber who leaves his office or home, and expects a message can call up the exchange and have his line connected to this "message switchboard," if we may use this term. The regular operator makes this connection with the special switchboard. If another party calls up this subscriber, the call is at once received at the "message switchboard" and does not pass through the regular switchboard, thus avoiding all delays. The message is received, and recorded. When the subscriber returns to his office he can call up the exchange, and being connected to the message operator, receives the messages left for him, after which the connection is broken, and any further calls on his part go through the regular switchboard. The introduction of such a message operator would enable subscribers to leave messages for other parties, who do not answer on calling, and the operator can call up the desired line at intervals and finally deliver the message without waste of time on the part of the subscribers. To prevent fraud by having some third person receive messages not intended for him, the subscriber can agree on some code or pass word which he will give to the message operator, and without which she will deliver no messages.

The charges for this special service might be made by the year in case the service is frequently used. In this case special telephone instruments might be installed. In less frequent cases, an increased charge could be made for each message received and delivered. This solution would probably meet all cases and would be more desirable than the interruption of calls for these important or hurry calls. Still, it may be better to use both systems, breaking no connections, however, unless satisfactory proofs are given of the absolute urgency of the new call. The idea to keep calls for a subscriber, and call him only at a certain specified time, and then deliver the messages received is found in Christiania only. A similar practice prevails in Germany with telegrams, where arrangements can be made not to deliver a telegram until a certain time. There is no reason to believe that the same practice could not be followed in telephone service if the need arises.—Rudolf Fischer in the *Zeit. f. Schwachstromtechnik.*

HIGH FREQUENCY APPARATUS FOR WIRELESS TELEPHONY.

The following article is to give a general account of the development of high frequency apparatus for wireless telegraphy and telephony without, however, going much into details of various instruments.

Since a few years there has gone on a gradual process of standardization among wireless telegraph and telephone instruments, so that at present, the primary energy in nearly all cases is about 500 periods per second. A high tension transformer in this circuit works in such a way, that there is a discharge of sparks every half period. Most of the transformers differ in their arrangement of the spark current circuit; they are uniform, however, in the attempt to eliminate the light arcs immediately after the first discharge, so that the high frequency circuit shall be at liberty to discharge with its natural number of periods without returning its energy to the exciter apparatus.

The introduction of the 500 period generators was a great forward step in wireless communication. Experience showed that the human ear is very sensitive to impulses of about 1,000 periods per second, which is equivalent to an alternating current of 500 periods. If such a high frequency system is compared to one of lower frequency it is at once apparent, that more energy can be sent out with the same antennae height, since the energy which is transmitted by a single current impulse is limited, whereas the average quantity of energy is proportional to the number of impulses per second.

The receiving apparatus for such a system consists of a telephone. Since the latter is unable to follow the high frequency portion of the electric waves, a type of rectifier must be provided, in order to transform the vibrations into rectified currents. With this arrangement the telephone receives 1,000 rectified current impulses per second and the diaphragm of the telephone receiver gives forth a sound which can be heard by the operator.

The possibilities of decreasing disturbances in operation are much greater when using high frequency instruments than with the older type. The older system caused each current impulse to be accomplished by a number of rapidly dampened sound waves, whose rapid succession was not uniform, however. With this new system, the succession is very rapid and uniform in rate, and the generator can be regulated, provided the revolutions of the motor can be governed, which is easy enough. The older system could be used for wireless telegraphy only, whereas the new high frequency machines can be used for telephony as well. To transmit human speech, there must be a constant flow of electric energy, which can be changed to agree with the change in sound waves in the voice. The new high frequency instruments make it possible to extend wireless telephone services for great dis-

tances, and there is no question but that wireless telephony across long distances will soon be on as commercial a scale as wireless telegraphy, with the added advantage of better communication. Numerous experiments have been made to build telephone transmitters and receivers for such long distance work, and it is not improbable that a few years will see the perfection of instruments sufficiently powerful to meet even the most severe requirements.

The most recently completed high frequency apparatus, built and perfected by Prof. Fessenden will be briefly described in the following paragraph. The new machine is of the inductor type and has a new style of arrangement for the magnetic circuit, allowing the construction of a rotor of extraordinary speed. The armature consists of a steel disc with a very thin edge. The field is excited by two coils placed concentric to the metal disc and generates a current passing through the cast-iron shell and the armature. The metal disc is slotted along the outer edge, and the slots are filled with a non-magnetic material, so as to absorb the contrifugal force and offer as smooth a surface as possible to the air currents. The normal rotor for 100,000 periods has about 300 slots on the rotor circumference. The usual generator for this same period has 600 slots, and a machine with the same type of coils for 200,000 periods would require 1,200 slots. A new type of winding was used which reduces the number of slots by two-thirds. This new winding requires only 400 slots for a 100,000 period generator, and 800 for the 200,000 period machine. In addition the construction of the rotor was simplified so much that a very high rate of speed was obtained with resulting higher frequency.

Tests made with this new high frequency apparatus allowed excellent communication for a distance of 204 miles. The machine was placed directly between antennae and earth and gave a voltage of 100-200 volts. If the frequency is limited to 50,000 periods, the amount of energy produced is much higher than with greater frequencies, so that a smaller frequency machine is better for long distance work. When using this high frequency machine for wireless telephone operation a water cooled carbon transmitter of high energy was used.

In the field of wireless telephony, experience has shown that the limits of communication are reached as soon as the microphone has been built for the greatest possible distance, which is at best very small. The author made experiments some years ago and found that the distance of communication could be increased by using an alternating current machine, in which a telephone current was used for field excitation, and where the current generated by the armature was considerably greater than the energy used in the telephone for excitation purposes. The principle of this generator differed somewhat from the usual types, as the same coil was used for excitation and generation of the alternating current. This proved to be very efficient and reduced the losses of voltage through self-induction in the field coils to a minimum. The principle of this generator is about as follows:

If a coil is excited by direct current, and its magnetic circuit is closed by an armature, which changes its air gap constantly, then the energy flow will change accordingly, and an alternating current E. M. F. is produced in the magnetisation coil. In its simplest form this arrangement is ineffective, as the alternating current tension is short circuited in its relation to the direct current exciter. It is therefore necessary to use at least two coils, connected in such a way as to have the A. C. tensions neutralize each other in contrast to the direct current. This leads to two types of connections. In one, the same wire is used for both the excitation current and the alternating current, whereby the exciter current flows through both coils in series, and the alternating current through the same coil in parallel. In the second, several kinds of wire are used, and the exciter current flows through two exciter coils in series, in order to destroy the resulting E. M. F. in this way, while the alternating current coil can be either in parallel or in series. The coil can embrace either one or several poles. The frequency is determined by the relation between the stationary and moving parts of the machine.

Up to the present time it has not been possible to attain speeds above 2/3 of those obtained with solid steel rotors. Even then the lower efficiency factor must be taken into account. The greatest advantage in this type of machine lies in the unlimited relation between winding of coils and the frequency. Broader slots can be used on the rotor disc than on the A. C. machines of the inductor type. The solid steel rotor seems after all to be the best one for high frequency machines. The experiments in the field of wireless telephony are therefore concentrated on obtaining high frequency currents of greater intensity, than those obtained with a carbon microphone, even if water cooled. Several trials have already been made with a high voltage transformer, which seems to promise the same advantages as the microphone used in the exciter circuit, and allows in addition the use of a solid steel rotor.—Ernst Alexanderson in the *Eletrotech. Zeit.*

People to Vote on Toll Rights

Unless the ordinance is vetoed by Mayor Seberger, the electors of St. Cloud, Minn., will be given an opportunity to vote on the question of whether or not the Tri-State Telephone and Telegraph Company shall be allowed to operate toll lines in St. Cloud. The electors will decide at a special election to be held September 17, primary election day. According to the ordinance provisions the company shall defray the costs of such election.

R. B. Brower appeared for the Northwestern Company and called attention of the council to ask that in consideration for the farm neighbors the Tri-State ordinance be not adopted.

Attorney Randall, for the Tri-State, submitted a petition bearing several hundred signers asking that the matter be submitted to the people.

Wisconsin Commission News

The Ashland Home Telephone Company has been authorized to increase its revenues by raising the rate on single-party service from $1 per month to $1.60 per month. Permission was granted to introduce two-party and four-party service with rates of $1.35 and $1.10 respectively. The schedule of rates as petitioned for was not granted because it would mean a 12.5 per cent rate of return upon the reproduction cost of the plant. The revenue which will be derived under the commission's schedule is supposed to be sufficient to provide for a 6.5 per cent depreciation fund and a 7 per cent return on the reproduction cost.

The Telephone Scrap Book

Laying a Cable in the River Trave

THE crossing of rivers and lakes by cables doubtless belongs to the most difficult operations met with in electric installation work. Difficulties begin in planning the plant, and in estimating the cost which is influenced to a high degree by local conditions, the depth and condition of the bottom, rate of flowing of the water and other factors. Even if these have been carefully and accurately studied, they undergo changes before operations are actually begun.

The main difficulty of the operation is due to the necessity of avoiding any injury to the cables in lowering them into the river or lake and of insuring their proper arrangement at the bottom at convenient distances apart.

When erecting the Lubeck power transmission plant, according to the Berlin correspondent of the *Scientific American*, it was necessary to cross the River Trave near Lubeck with a number of cables, viz.:

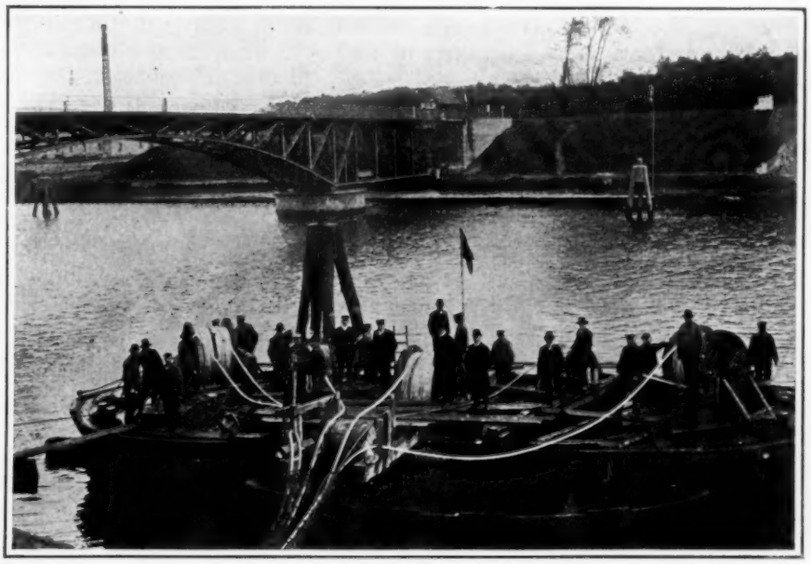


Fig. 1.—The Pontoon at Work Paying Out the Cable Over the Drum.

Two 6,000-volt high-tension cables of 33 × 0.007 square inches cross section, 525 feet in length.

Two 700-volt low-tension cables of 3 × 0.054 square inches, and 426 feet in length.

A 10-strand telegraph cable 426 feet in length.

A telephone cable 525 feet in length.

Fig. 2.—Diver Emerging After Inspection of Cables.

These cables were covered with a heavy wire armature, rendering them sufficiently resistant against any tractive strain and protecting them against damage.

The two high-tension cables, the telegraph cable as well as the telephone cable were each wound on a special drum, whereas the two low-tension cables were carried by one single drum. The weights of the cables and drums were:

High-tension cables	2,373 kilogrammes
Low-tension cables	2,163 kilogrammes
Telegraph cable	980 kilogrammes
Telephone cable	972 kilogrammes

The width of the water level at the point where the cables were to be laid out is 80 meters, the maximum depth of the river being 12 meters. A groove 6½ feet in depth and 33 feet in width had been dredged out for the cables, this considerable width being rendered necessary by the unfavorable conditions of the river bottom.

Fig. 1 shows to the left, the two low-tension cables wound up on a drum. The two cables, guided by round timbers, were made to slide over slanting round timbers into the water. The two high-tension cables and the telephone cable were let down into the river over a large pulley installed in the middle. The telegraph and low-tension cables were guided by round timbers. Anchors connected by a chain were cast to the right and left respectively of the groove to moor the cables to the river bottom, each cable being fixed to the chain by ropes wound around it.

In unwinding the cables the pontoon was slowly hauled over by two capstans installed on the opposite bank of the river, being fixed to the anchored chain, the cables had to slide into the groove dug at the river bottom.

The pontoon was prevented from turning or drifting by anchors cast on both banks at about 100 feet distance from each side of the groove, with which the pontoon was connected by slack ropes. A flagstaff was

fixed in the middle of the pontoon and those superintending the operation from the riverside would take care to keep the flagstaff in the center of the cable groove, the position of the pontoon being adjusted by tightening or slackening the ropes. Such slack ropes are, of course, arranged in accordance with local conditions, being fixed, in the present case, to ice breakers or to barges moored in the river.

The operation of drawing the pontoon from one bank to the other occupied two hours. Care was taken throughout this time—by braking each cable drum more or less strongly—to have each drum unwind its cable uniformly, the distances between each two cables being kept constant.

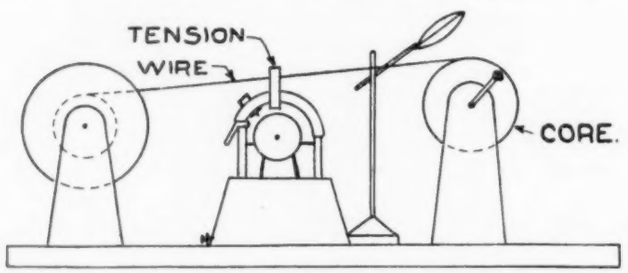
After the pontoon had reached the opposite bank, the cable ends were taken off the drums and carried ashore. The cable sections protruding out of the water having then been supported by two small boats coupled together the pontoon was withdrawn from beneath the cables.

By pulling each cable from the riverside and dropping it from the boat into the water, its proper position in the dredged groove was insured also at the other bank. A diver, Fig. 2, went down to the river bottom after the operation had been completed, to insure that there was nowhere a crossing of high-tension cables with low-tension or telephone cables. After he had made sure that the position of the cables below water was quite irreproachable, the cable groove was filled in with sand.

A Simple Wire-Winding Apparatus

WHEN the amateur experimenter starts to building coils, the winding of the wire generally looks like a great task to him, says Norman Barden in the *Scientific American;* and so it is when the wire to be wound is small and hundreds of feet are to be coiled. It so happened that the writer was interested in the making of a large ozone generator which had to be finished in a very short time. The secondary was to consist of 10,000 feet of No. 40 enameled wire. How to wind the wire in a short time without breaking it or having any laps in the winding was the problem.

The driving mechanism of an old model Edison phonograph was brought into use, and made to guide the wire and at the same time to keep it taut. This was done in the following manner: A tension was fastened to the bridge that carries the needle. The machine was placed so that the tension was about three inches from the core, which had been put between centers as shown in the accompanying figure. The



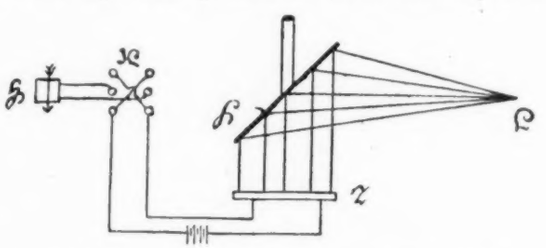
Using a Phonograph for a Winding Machine.

speed of the machine was then slowed down so that the core could be turned about seven times while the tension moved to the right a distance of one fiftieth of an inch, i. e., while the record cylinder made one revolution. In this way the wire was wound on the core, which was three inches in diameter, in one afternoon. A magnifying glass was used as shown in the figure to assist in watching for any kinks in the wire.

It was surprising to find how well the work could be accomplished when one person turned the core and another regulated the speed of the machine and watched for any trouble in the winding. With this arrangement, as soon as anything went wrong, the one turning the core would immediately stop, and the other person would drop a little paraffin on the wire on the core to prevent it from becoming loose. A part of the wire could then be unwound and the trouble fixed with no fear that the rest of the winding would be loosened. It was also found necessary to have the distance between the core and wire reel as short as possible. The shorter this distance the less danger there is of the wire's breaking. This last applies especially to the winding of the finer wires. Two other factors are to be taken into consideration. These are that the reel must turn very smoothly and easily, and that the winding must be done evenly and not by jerks.

New Selenium Cells

OF THE various forms in which selenium cells have been constructed the most efficient is Bidwell's wire cell, says Paul Jenisch in *Elektrotechnische Zeit-*



script, which consequently is employed almost exclusively, although its construction presents certain well-known difficulties. This cell is made by winding two wires close together on an insulating core, and filling with selenium the narrow interstice between the wires. The commercial Bidwell cells are quite sensitive to light, but they possess considerable electrical inertia. They also have high resistance, because the insecurity of position of the wires imposes a limit to the narrowness of the interval between them, and because the dimensions of the cell are limited by difficulties of construction which increase rapidly with the size.

In my attempt to improve the selenium cell I first endeavored to ascertain how the electrical inertia could be diminished. For this purpose I constructed the apparatus indicated in the diagram, in which a selenium cell Z is illuminated intermittently by light emitted by the source J and reflected by the rotating mirror S. A commutator K is connected with the axis of the mirror in such a manner that the current flows through the galvanometer in the positive direction, while the selenium cell is illuminated and in the negative direction when the cell is in darkness. The moment of inertia of the suspended coil must be so large that the fluctuations impressed upon the current by the intermittent illumination of the selenium cell do not affect the pointer of the galvanometer sufficiently to make the reading difficult.

In these conditions the deflection of the galvan-

ometer measures the difference between the currents flowing through the selenium cell in the periods of illumination and of darkness, and the deflections obtained with different cells of approximately equal resistance and sensitiveness indicate the difference in electric inertia. In this way it was possible to proceed systematically with the construction of experimental cells and to prove that the electric inertia depends largely on the manner in which the selenium is heated.

After many laborious experiments I succeeded in constructing a selenium cell which almost instantaneously assumes the resistance corresponding to any degree of illumination, so that the so-called "creeping" of the current is almost entirely eliminated.

When cells of the older types are suddenly illuminated several minutes elapse, as a rule, before the resistance which corresponds to the illumination is attained. In the new cells the change in resistance is effected in an instant. The voltage limit of the old cells, furthermore, is very small, but the new cells can carry a load of several hundred volts without injury, and without the employment of auxiliary resistances.

The new cells possess the maximum sensitiveness to light, owing to the very advantageous distribution of the selenium. The resistance is exceedingly low because the distance between the electrodes is reduced to a minimum. The resistance can be further diminished by increasing the dimensions. Cells of 12 inches diameter have already been constructed.

The new cells show very little electric inertia with decreasing illumination and practically none with increasing illumination. Deterioration due to chemical change is entirely prevented by the employment of platinum electrodes and the complete exclusion of air, and the capacity to withstand high voltage exceeds all possible requirements. Cautious experimenting with galvanic batteries is consequently unnecessary, and the danger of short circuits and the destruction of valuable instruments is entirely eliminated. Even sparks produced by the employment of excessively high voltages do not seriously injure the cell, but at the most, merely destroy the usefulness of minute portions of the sensitive layer.

In the new cells a thin coating of metal deposited on an insulating base is divided by fine scratches into two or more parts, which serve as electrodes. The metal is then covered with pulverized selenium which, when heated, melts and fills the scratches. This construction possesses the advantages that the distance between the electrodes can be reduced to a minimum, and that the size and shape of the cell can be varied indefinitely. The circular form has been chosen as the normal, as it is the best adapted to most uses. The new cells are patented.

Improvement in Storage Batteries

IT HAS long been known that the Hatch type of construction for posted lead storage batteries possesses some advantages, such as great porosity, light weight and thorough working of the active material, says the *Electrical Review*. These are secured by employing unglazed porcelain or other earthenware grids in place of the customary lead or antimonious-lead grids. In the actual usage of such batteies, however, difficulties have developed that have hindered their commercial application. One of the most serious of these has been that imperfect contact between the active material and the lead conducting sheet that lies against its flat face has commonly resulted from the continual expansion and contraction of the active material during discharge and charge.

To overcome this and other difficulties, Gustavus J. Johnson, of Chicago, Illinois, who has had much experience with batteries of this type of construction, has invented several improvements that were recently patented. This patent is, in a sense, a development of

Fig. 1.—Cross Section Through Johnson Plate.

one issued to Mr. Johnson about two years ago. The more recent patent has been assigned to E. C. Tourtelot, of Chicago, Illinois.

A horizontal section of the type of plate used is shown in Fig. 1, in which the earthenware plate *A* is indicated as having vertical ribs *a*, which are crossed by similar horizontal ribs, thus forming pockets for the reception of the active material *E*. The opposite side of the plate has vertical ribs a^2 only, forming long vertical channels for the free circulation of the electrolyte. Mr. Johnson provides a small hole a^1 in the thin web opposite the center of each pocket to still further increase the accessibility of the active material to the electrolyte and thus decrease the internal resistance at the beginning of charge. Against the face of *E* is laid a thin sheet of lead and against this is another plate with its active material in intimate con-

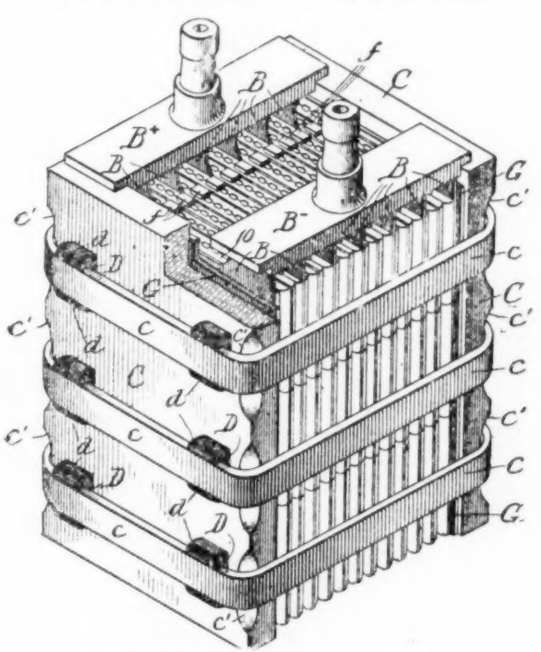


Fig. 2.—General View of Jounson Element.

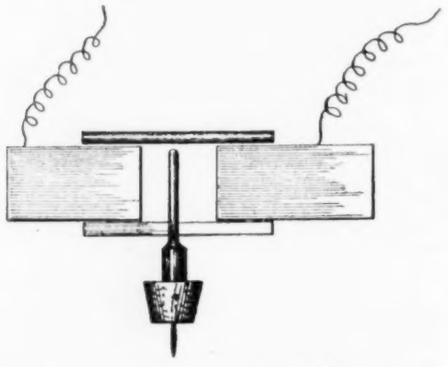
tact with the sheet, which serves as a conductor to lead the current to and away from a pair of such plates constituting a single positive or negative unit plate. Formerly the size of Hatch cells has been limited by the size of the unit plates. Mr. Johnson increases the size of his finished plates, however, by assembling a group of units. Figure 2 shows an assembled element consisting of 7 negative and 6 positive plates grouped

in the usual manner. Each of these plates is indicated as being made up of six units, two side by side and three high. A series of hard-rubber keys *f* holds the units together vertically. The outer side edges of the units have their edges rounded, as shown at a^3, and the extreme edge a^4 is rendered impervious to the electrolyte so as to render the side edges of the finished plate inactive and thus prevent their being short-circuited by the lead-antimony bands *c* that serve to bind the entire element together.

To provide a means for taking up expansion and contraction and that will insure keeping the lead electrode sheets in close contact with the active material, Mr. Johnson places an elastic rubber plate *G* between the end electrode plates of the element and the end supporting plate *C*. These will give the cell the necessary flexibility.

A Simple Microphone

A SIMPLE microphone and also a rather unusual application of this interesting instrument is described by C. C. Kiplinger in the *Scientific American*. It comprises two short lengths of ¾-inch electric light carbon. These are inserted in each end of a bit of ¾-inch rubber tubing.



Experiment With a Home-Made Microscope.

The ends of the carbon rods within the tube should be about ½ inch apart. This space is loosely filled with granular carbon free from dust, obtained by crushing arc-light carbons in a mortar. The granules should not be more than one thirty-second inch in diameter. The pressure on the particles may be varied by shifting one of the rods.

Copper wires are twisted tightly about each rod to serve as connectors. If the carbons are copper-plated the wires should be soldered to the plating.

The instrument is connected in series with a telephone receiver and a battery of a half dozen cells. When the microphone is properly adjusted, a very small disturbance of the carbons will cause a corresponding movement of the carbon granules, and the resistance offered to the current will change. This causes a sound in the receiver. A cigar box provides a good sounding board for the apparatus.

With a slight modification, this device becomes a first-class reproducer for a gramophone. The sound waves engraved on the record may produce electrical vibrations, which in turn, are reconverted by the telephone receiver into sound waves in air. A loud-speaking receiver will make these audible to a large audience.

A small slit is cut in the center of one side of the rubber connector. A short piece of three sixteenths inch brass tubing is flattened for a part of its length by hammering, and the flattened end passed through the slit so that it just clears the opposite side of the cavity. The flat surfaces of the tube should be parallel to the ends of the carbons. A small cork and needle are attached to the other end of the tube, as shown in the sketch.

The photograph shows the apparatus in working order. It is supported by a stand, a heavy wire, and a counterbalance of some sort. The connecting wires should be very flexible, so as to offer little resistance to the motion of the microphone. The sound waves inscribed on the record are transmitted to the carbon granules by the needle and brass tube. The receiver may be at a distance from the reproducing microphone.

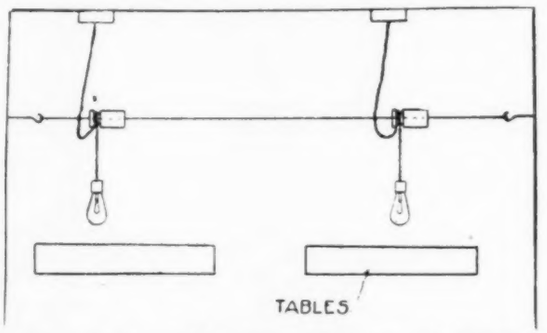
Very interesting results are obtained by changing the angle of the needle with reference to the disk, so that the record may be run in the opposite direction. The vibrations are reversed in order, as are the vocal inflections, producing in many instances extremely ludicrous effects.

Drawing Board Lights

EVERY draftsman knows of the difficulty encountered in adjusting the ordinary pendant incandescent lamp so that the light will be projected on the board at the point where he is working. It is not only difficult to anchor the lamp in place, but trouble is also experienced in maintaining it at the correct height above the board, at the same time.

Many of these troubles are overcome by the use of the device shown in the accompanying sketch, which has been in active service for at least five years in the drafting room of a large car company. The fact that it is cheap, efficient, and easily installed should commend it to drafting rooms where adjustable fixtures are not already installed.

An iron wire is stretched lengthwise along the row of tables and is fastened to the wall by means of screw eyes. Sliding freely on this wire are several ordinary porcelain knobs corresponding to the number of tables on that line. The flexible lamp cords hanging from the rosettes placed in the ceiling above



the center of the table, are fastened to the porcelain knobs by means of tape or binding wire, care being taken to leave enough slack in the lamp cord to allow a full movement of the lamp from one end of the table to the other.

When once adjusted to the correct height, it will remain at this distance no matter what position the lamp may occupy in regard to the table.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

WHEN he was fifteen years old, he went to work for the Western Electric Company. You could say the same thing about tens of thousands of others. But when you know that he went to work for the Western Electric Company in the engineering department, telephone division, under C. E. Curtisson, that is something that tens of thousands of others didn't do. It makes a difference where and how you start. In tremendously big concerns, it makes a further difference who is boss, for boys of fifteen are not concerned in the politics of the thing. They usually take pride in seeing how much they can do in a day, rather than how many they can "do" that day. A real boss will find the real boy and push him along.

It was fortunate, then, that Harry Slemin found a good executive when he went to work for the Western Electric Company in 1896. He found many things to do and did them well. He was shifted about a bit and advanced occasionally until seven years later he had full charge of the concern's repair business. And for a chap of twenty-two he had a man's size job. He was getting away with it, with nary a care, when M. S. Conner, chief engineer of the Stromberg - Carlson Telephone Manufacturing Company, offered him a place as apparatus engineer in charge of engineering forces. Young Slemin accepted the place. Here was a smaller concern offering more money and a better opportunity. It was his duty to organize the engineering department, under the direct supervision of Mr. Conner. He did this so well, that other departments called for his services. The cable business of the company responded to the suggestions he offered and became more satisfactory. The work took hold of Slemin as he took hold of it. He found himself specializing. The foreign sales department was particularly interesting.

Of Himself, By Himself.

In 1907 he had made such thorough study of the company's affairs that the publicity department was turned over to him and in less than two years he was given the sales management in connection with his hurrah efforts. He was thirty and still single, but not for long.

In June, 1909, the bride's month, and in the city of roses, Harry C. Slemin was married to Rosa Erbe, of Rochester. With his wife and son, he lives in a beautiful home in the suburb, Brighton. It is a home that the Slemin's have built after their own plans. It nestles back in the hills and has all the comforts and conveniences that go with modern habitations. The house-warming was one of those long-to-be-remembered, or never-to-be-forgotten events, participated in by those who are lucky enough to know their friends.

Slemin belongs to a number of clubs and things, but he lists them like this: Rochester Advertising Club; Technical Publicity Association; American Trade and International Manufacturers' Association; Railway Telegraph Superintendents' Association; Rochester Club and Oak Hill Country Club. By which you will be quick to comprehend that advertising is his pet, business his mania and golf his hobby—so far as other men can shape it. However, you must remember that across Lake Erie lies Canada and that fishing is good in the Muskota country. Then, too, a fishing trip is never complete without a camera and Slemin fairly dotes on pictures. As a sample of his work, the portrait on this page is of himself, by himself. The original photograph is done in those delicate sepia tones that make an engraver swear, but that matters little, because engravers are all sworn at.

They do say, too, that Slemin plays golf to beat the band. On the Rochester course of the Oak Hill Country Club, they have a pocket-piece, worth about three Chinese sen. They call it the "goat." Slemin can show you that goat most of the time, which proves that the other fellow hasn't got his.

Among his inventions is "Phoney Bill," with whom you are acquainted. The Slemin baby and "Phoney Bill" have their birthdays together, but the baby is the prettiest of the two! Both are very popular.

Harry C. Slemin was born in Toronto, Canada, the day before July 4, 1879. The celebration followed according to the traditions, although somewhat unusual for the Dominion. He was educated in Toronto's public and high schools and finished at the old Manual Training School at Twelfth and Michigan, Chicago. He stands erect, weighs about 180 in a gymnasium suit, has plenty of hair and a keen, brown eye. He believes in selling. He knows what salesmanship is and what it means. He is a good listener and a splendid conversationalist—when you get around to his particular subject.

New York Commission News

The New York Public Service Commission, second district, received a complaint from the village board of Solvay, Onondaga county, directed against the telephone service and rates in that village. The complaint alleges that the rates are not the same as those demanded and collected from other users, that the service as now constituted, compels a subscriber in the village of Solvay in many cases to pay a toll of five cents in order to talk with another subscriber in the village; that a subscriber in the village of Solvay, who is connected with the Solvay exchange only, must pay a toll of five cents for every call he makes in the city of Syracuse; that a subscriber in Solvay, who is connected with Syracuse exchange and not with the Solvay exchange, can not be called by any subscriber in the village who is connected with the Solvay exchange without such subscribers being obliged to pay toll of five cents; that a subscriber in the village of Solvay in order to get an unlimited service of the city of Syracuse and from the city of Syracuse, must maintain two telephones, paying for double service when the same service might be provided with a single instrument.

The commission is asked to make an order fixing reasonable rates for the service in this village and wiping out the five cent toll charge referred to.

A complaint from Lynd A. Cox, residing at Snyders Lake, Wynantskill, Rensselaer county, has been made to the commission against the Commercial Union Telephone Company. The complaint alleges that since June 7 the Commercial Company has refused to furnish service without any just cause, while other residents located at Snyders Lake are enjoying service by that company; that the residents of the complainant has been equipped with a Commercial Company telephone for three years and has had service, and alleges that he has always paid his bills and is willing to pay a reasonable sum for such service now. The Commercial Union Company states that the line on which the complainant has heretofore been served is the property of the Andrews Home Telephone Company of Wynantskill and that the Commercial Union does not own the line or furnish service in that locality. Owen D. Conway, of Troy, attorney for complainant, states that the Andrews Telephone Company is simply an aggregation of persons who agreed to take a telephone after a certain number of subscribers had been obtained. Mr. Conway believes that the commission, although it has no jurisdiction over the Andrews Home Telephone Company, has jurisdiction to require the Commercial Union Company to furnish service to Mr. Cox as long as it serves other residents of Snyders Lake.

As a result of an inspection made at Mt. Morris, N. Y., by an inspector of the commission, the Federal Telephone and Telegraph Company has advised the commission that it is rehanging the cables, pulling up slack wires, and in general putting the outside plant of this exchange in good condition. It also states that attention is being given to the storage batteries and apparatus in the general office, as well as changes in the operating room, with a view to improving the service.

The Federal Telephone and Telegraph Company's office at LeRoy, N. Y., will make improvements in the outside plant, as recommended by the commission.

Following an inspection of the Downsville, Telephone Company's exchange at Downsville, N. Y., by an inspector of the commission, the telephone company has advised that it will comply with all the suggestions made in the report of inspection as speedily as possible with the view of improving the service rendered to its subscribers, and that it is arranging to give 24-hour service after January 1, 1913.

The Northwestern Telephone and Telegraph Company's exchange at Benson Mines has advised the commission that improvements in the central office had been taken care of, and that the poor transmission on toll connections was due to interference from road work, but now that the road work is completed it would attend to the reconstruction and eliminate all further difficulty.

It is also stated that the recommendations in regard to storage battery connections, switchboard jacks, pay station lines, supervisory lamp caps, light and power wires and railroad crossings will be taken care of as soon as possible.

The commission has completed an inspection of twenty of the twenty-six central offices of the New York Telephone Company in Manhattan, which serve 327,840 subscribers, or about 78 per cent of total number of subscribers within this main section of Greater New York.

Public opinion concerning the service was carefully canvassed, and considerable complaint expressed by the users in some sections. Most of this adverse criticism was on account of getting wrong numbers and being subjected to "cut offs." No complaint was registered concerning the speed of the service nor concerning line and instrument troubles.

The commission's inspectors examined the equipment and central office methods thoroughly and made record of over 2,500 test calls from subscribers' stations and the company's central offices. The average speed of first answer by operators was found to be a fraction above five seconds. Special attention was given to the causes for the defective service which caused complaint, and the inspector's reports call the telephone company's attention to specific cases where there was found to be an overload and where there was a shortage of operators or too high a percentage of inexperienced operators. These matters have since been taken up in informal conference with the officers of the telephone company with the result of effecting a number of changes which will tend to improve the service.

David H. Gregory, of Cooperstown, has complained against the Otsego & Delaware Telephone Company, stating that he has been a patron of the telephone company since it commenced business; that in May of this year the company sent him a contract providing for service for the season at a charge of $12; that it was not his intention to occupy his house in Cooperstown for more than a period of eight or nine weeks and he returned the contract as unsigned and as being unsatisfactory. Since that time he has been unable to get the telephone company to furnish him service at a reasonable rate. The complaint recites that the local agent informed him verbally that the Public Service Company permits the company to charge the season price for a less period, which, of course, is not the fact, and that installation charge was costly. Complainant states that in fact there is no other installation charge than joining the wire at the pole as the instrument is installed in his house and the wires run from it to the pole.

The Great Northwestern Telegraph Company has notified the commission that it will correct the listings in the tariff book to show that messages to Belleville, Henderson Harbor, Rodman, Roberts Corners, East Rodman

and Lorraine will be delivered free by telephone to telephone subscribers in these places from their Adams, N. Y., office.

The above is the result of an inspection made by an inspector of the division of telegraphs and telephones of the commission, who found that the listings for these points showed an additional charge for all messages to these points.

Because of the resulting increase in rates, the commission has denied the application to consolidate the independent and Bell companies in northern New York. The petition of the Mountain Home Telephone Company was for authority to issue stock and bonds, and of the Adirondack Home Telephone Company and New York Telephone Company for approval of the transfer of certain local franchise to the Mountain Home Telephone Company.

The commission points out that it is entirely competent for the companies to transfer the physical properties without the consent of this commission under the law as it stands.

The Northwestern Telephone and Telegraph Company has applied to the commission asking for the approval of the issuance by it of $11,000 of bonds. The company operates in the counties of Jefferson, Lewis and St. Lawrence, the principal office being at Carthage. The company asks permission to issue bonds at not less than 95, the proceeds to be used for the installation of a new switchboard, an equipment power plant aerial cable, the installation of a new toll circuit between Carthage and Black River, at which point connection is made with a line of the Bell Company to Watertown, a new toll line between Harrisville and Bensone Mines, and the purchase of property and in the discharge of lawful obligations.

The Law and the Telephone

By E. J. Wenner

TELEPHONE CONVERSATION IN EVIDENCE—WITNESS NOT ALLOWED TO TESTIFY—GUESS OR INFERENCE.

IN the trial of an action by a wife for the alienation of her husband's affections plaintiff was allowed to testify to certain telephone messages between her husband and some person at the other end of the line. She heard but one part of the conversation and was allowed to detail what was said by the person who was being communicated with. Her statements were of course an inference deduced from what was said by her husband. The Supreme Court held that such was the case and reversed the ruling of the court below. Miller v. Miller (Iowa), 134 *Northwestern Rep.* 1058.

INJURY CAUSED BY SAGGING WIRES—NEGLIGENCE—MAINTENANCE—DUTY OF OWNER.

Plaintiff was a bus driver of Sturgis, South Dakota, and on the evening of August 20, 1910, after dark, he delivered passengers to their homes on one of the principal streets of the city. While he was seated on the top of his bus and driving in the middle of the street at a moderate trot he was caught in the mouth by a telephone wire owned and maintained by the defendant, Reed. He was thrown from his bus and a portion of his teeth and jaw bone violently torn from his mouth.

An ordinance of the city of Sturgis requires that all telephone wires be strung at least sixteen feet above the level of the streets. It was shown that the wire in question was attached to a barn on one side of the street and a house on the opposite side; that the point of the attachment to the barn was about 15 feet above the ground and the point of attachment to the house about 12 feet above the ground. There was ample evidence tending to show that the wire had been loose and in a sagging condition for some months and that it had sagged at least eighteen inches.

The jury in the court below returned a verdict of $920 in favor of plaintiff, and defendant appealed on the theory that certain expert evidence given by a dentist as to the effect upon the health where teeth are removed was improper.

The Supreme Court held that there was sufficient evidence to justify a verdict in favor of plaintiff on the grounds of the negligence of the defendant, although he had no direct knowledge of the condition of said wire previous to the accident, also that the defendant was not negligent.

The court reasons that a telephone company is bound to use ordinary care and reasonable diligence to place and keep its wires in safe condition when they extend over or along a public street or traveled road. Greater care and diligence is required where the wires are over the streets of a city than over a highway in some sparsely settled district of the country. Actual notice of defects or dangerous conditions is not necessary. Facts from which notice may be implied is sufficient, and if defendant negligently remains ignorant, it is equivalent to actual knowledge, if the defect or danger could have been discovered by the use of ordinary care, and when the condition has existed a sufficient time to enable the owner to discover it, had he exercised care, he is bound the same as if actual notice had been given him. Thompson v. Reed (South Dakota), 135 *Northwestern Reporter* 679.

WISCONSIN STATUTE AS TO FRANCHISE—OPERATION AND REGULATION OF TELEPHONE COMPANIES—CONTRACTS.

In March of 1903, the city council of Kenosha, Wisconsin, passed an ordinance giving the Citizens' Telephone and Telegraph Company the right to use the streets, alleys and business places of said city for the purpose of erecting and maintaining telephone poles, wires and cables, and other appliances necessary in the construction and maintenance of a telephone exchange. Said ordinance gave the telephone company, its successors and assigns the privilege to so operate for a period of fifty years.

A provision of the ordinance required the telephone company to furnish certain telephones free of cost for the use of the city.

In October of 1905, the Kenosha Home Telephone Company purchased the physical property of the Citizens' Telephone and Telegraph Company. The franchise, however, was expressly omitted from the bill of sale. The new company continued to furnish free service until November of 1908, when it refused to do so on the ground that it had been notified by the Wisconsin Railroad Commission that it was unlawful.

The trial court held that the defendant was not the successor of the Citizens' Telephone and Telegraph Company and entered judgment dismissing the complaint of plaintiff in which it was sought to require the defendant to furnish free service to the city.

Upon appeal the court held that the ordinance was invalid and illegal on the theory that Sec. 1779 of the Statutes of Wisconsin provides that no franchise is needed by the telephone company to enable it to conduct its business after it is incorporated pursuant to the laws. As soon as incorporated it becomes possessed of adequate authority to construct its lines upon the public highways and streets of the municipality, subject only to reasonable regulations under the police power.

Sec. 499 of the laws of 1907 makes illegal the giving of free service, and after the passage of this act the defendant was in violation of the law if gratuitous service was furnished to the city of Kenosha. It then had a clear right and good reason to refuse to longer furnish free service to the city. Some claim is made that the ordinance in question if not a valid franchise is a valid contract beween the telephone company and the city, and that the law would be ineffective as to this on account of the constitutional inhibition against the impairment of the obligation of a contract. A decision was cited which bears out the contention of the city. However, in that case property was involved and the free service in question was given in return for a legal consideration given by the city. The court in that instance held the obligation of the contract could not be impaired and that the company furnishing the free service was not guilty of violating the law. In the incident case, however, there was no valid consideration supporting the granting of the purported franchise and there could be no impairment of the contract. The court specifically held that the purported franchise was not a contract between the telephone company and the city.

This decision announces the law of Wisconsin as to whether or not a legally incorporated telephone company is required to obtain a franchise to operate within the limits of a city or town. Until there are amendments to the laws it is safe to assume that the supreme court of Wisconsin will hold that a franchise is not necessary. City of Kenosha v. Kenosha Telephone Co. (Wisconsin), 135 *Northwestern Reporter* 848.

THE NECESSITY OF A FRANCHISE IN IOWA—LAW DIFFERS FROM THAT OF WISCONSIN—FORMER DECISION OF THE SUPREME COURT IS OVER-RULED ON REHEARING.

Something over a year ago the writer reviewed to some extent in Telephone Engineer the decision of the Supreme Court of Iowa in the case of East Boyer Telephone Company v. the incorporated town of Vail, and quoted extensively from the opinion in which it was held that the statutes of Iowa did not contemplate that a telephone company should procure a franchise in order to erect its poles and wires or maintain an exchange within the limits of an incorporated town or city. In the opinion of the court (Justice McClain) which was somewhat lengthy, the different statutes in question were quoted and construed. Statutes which it was understood provided for the securing of a franchise were interpreted to mean the contrary so far as telephone companies were concerned. Justice Weaver did not agree with the majority of the court and filed a strong dissenting opinion.

An application for a re-hearing was filed and granted.

In the meantime the case of Farmers' Telephone Company of Quimby v. the town of Washta, in which the same question was raised indirectly, was decided by the Supreme Court of Iowa (133 *N. W. Reporter* 361). Justice Weaver rendered the opinion of the court in which it was held that a franchise was necessary in order that a telephone company might operate within the corporate limits of a city or town. In this instance Justice McClain filed a dissenting opinion.

On May 16, 1912, the court reconsidered the case of East Boyer Telephone Company v. the incorporated town of Vail, and in a short opinion by the entire court followed the case of Farmers Telephone Company of Quimby v. town of Washta, and reversed their former holding in the East Boyer case. The later opinion on May 16, 1912, is "not to be officially reported."

Thus it is seen that after jumping from one decision to another in cases in which majority and dissenting opinions are filed, the court as a whole agrees that a telephone franchise is necessary by laws of the state of Iowa, and in a very brief opinion lays down the law of the state as requiring a franchise. East Boyer Telephone Company v. The Incorporated Town of Vail (Iowa), 136 *Northwestern Reporter* 120.

EMPLOYEE OF TELEPHONE COMPANY INJURED BY ELEVATOR —NEGLIGENCE—CONTRIBUTORY NEGLIGENCE.

Plaintiff brought suit against the Aberdeen Hotel Company and Northwestern Telephone Exchange Company claiming damage on account of the negligence of both defendants.

Plaintiff was an employee of the defendant telephone company and in company with Mr. Boland, a foreman, went to the hotel to install two telephones. It was necessary to attach the wires to a box on the inside of the elevator shaft on the sixth floor of the hotel. The box contained main wires of the telephone company and from it individual wires were to run, and it was necessary to place them through screw eyes inserted in the guidepost of the elevator. The elevator shaft was enclosed by an ordinary iron lattice. By ascending the stairs some few steps one could put his head into the shaft over the lattice work. The plaintiff had done this and was engaged in an investigation as to the screw eyes above mentioned when the elevator descended, striking his head and severely injuring him.

Plaintiff brought action against the telephone company and the hotel company, and in the court below secured a favorable verdict against each of the defendants.

There was much evidence as to conversations between the elevator operator, Mr. Boland and the

plaintiff, and an effort was made to hold the defendant telephone company liable on the theory that Mr. Boland was a vice principal. The supreme court held that such was not the case, and if plaintiff overheard all conversations between the elevator operator and Mr. Boland (he so testified) and had the same opportunity of observing the operation of the elevator as did Mr. Boland, he was guilty of negligence if he placed himself in a position of danger. On that theory the supreme court held the telephone company free from liability, but decided that the defendant hotel company was liable and on account of erroneous instructions by the court below, it remanded the case for a new trial in accordance with the findings of the court. Beier v. Aberdeen Hotel Co. et. al. (Minnesota), 136 *Northwestern Rep.* 757.

VOLUNTARY TELEPHONE ORGANIZATION NOT A CO-PARTNERSHIP—NOT A JOINT STOCK COMPANY—METHOD OF DISSOLUTION—METHOD OF TRANSFERRING SHARES.

The Waldron Telephone Exchange was originally a neighborhood arrangement by which 14 or 15 neighbors and residents of the village of Waldron, Michigan, co-operated in the purchase of a switchboard and individual telephones. It later expanded until lines were extended several miles into the country in different directions. By-laws were adopted which provided for methods of assessing the different individuals, etc.

The exchange made arrangements for long distance connections with Bell Telephone Company, Hillsdale County Telephone Company, and other telephone lines. It was understood between the parties concerned that should a person sell his farm or residence he might transfer his telephone to the purchaser and that purchaser would have the same rights and would assume the liabilities of the original owner. Early in 1910, a minority in number of the patrons of Waldron Telephone Exchange arranged with the agents of Hillsdale County Telephone Company for a transfer of the property of the former to the latter. It was understood that shares of stock in the latter company were to be given to each member of the Waldron Exchange, and that the exchange should be transferred to the Hillsdale company. On January 11, the agents of the Hillsdale Company took possession of the buildings, switchboards, exchanges, wires and apparatus of the Waldron Telephone Exchange and controlled same, and furnished, and offered to furnish telephone service to the patrons of the Waldron Exchange.

A majority of the members of Waldron Exchange resented the action of the minority and brought an action to restrain the Hillsdale County Telephone Company from carrying out the agreement made with the above mentioned minority. Some question is raised by the defendant as to the right of plaintiffs to bring the action. It is insisted that plaintiffs are not co-partnership and that the action should not be brought in that name. In fact counsel for the defendant insists that plaintiff has no standing in court.

The court below found with the company and dismissed the action and rendered a decree favoring the dissolution of the Waldron Telephone Exchange and obliging its members to accept certificates of stock in the defendant company. The decree further provided that if the subscribers of the Waldron Exchange refused to comply that the organization be dissolved and that a receiver be appointed to take possession of the property.

Upon appeal the court decided that the individuals composing the Waldron Telephone Exchange had a standing in court, and that the action of the minority was illegal and invalid; that the possession of Hillsdale County Telephone Company was a trespass and that the property should be restored to Waldron Telephone Exchange. The court further found that the Waldron Telephone Exchange was not insolvent or mismanaged and that its dissolution was not warranted, unless by agreement of the individuals composing it. Moore et. al. v Hillsdale County Telephone Co. et. al., (Mich.), 137 *Northwestern Reporter* 241.

Ohio Commission News

The Logan County Farmers' Telephone Company has been temporarily restrained from building a toll line between West Liberty and Degraff, on complaint of the United Telephone Company, on the ground that no certificate of public necessity has been secured from the Public Service Commission. The United Telephone Company operates exchanges at both points and a toll line between them.

The Cleveland Telephone Company has received permission from the commission to issue $900,000 of its capital stock to discharge outstanding indebtedness incurred in making improvements and extensions. The money is to be used to pay six per cent notes given for this purpose.

The commission orders that the stock be sold at the best price obtainable, not below par, and that the proceeds must be used strictly for the purpose stated in the application. The company must report every 30 days to the commission as to sale of stock and expenditure of the proceeds.

In answer to the application of the Hamilton Home Telephone Company for an order compelling the Cincinnati & Surburban Bell Telephone Company to handle its long-distance business betwen Hamilton and Cincinnati, the commission referred the principal question, which is the construction of Section 66 of the public utilities act, to Attorney General Hogan for an opinion. The Hamilton company has no line running into Cincinnati, but alleges that the law gives the commission power to compel the Bell company to accept toll traffic, having Cincinnati as its destination. The commission claims to have no jurisdiction in this case.

The Farmers' Telephone Company, of Shelby county, is seeking to invade the territory of the Sidney Company and the latter is invoking the Section No. 5 of the public utilities act and requiring the Farmers's Company to secure a certificate of public necessity. The latter has given testimony that the service provided by the Sidney Company is inadequate.

The case of the Hamilton Home Telephone Company against the Cincinnati and Suburban Telephone Company, in which the former made request for an order permitting it to use long-distance lines of the latter company out of Cincinnati, has been dismissed by the Public Utilities Commission.

The commission ordered the representatives of the companies to frame a tentative order of dismissal to be passed upon by the commission.

Dielectrics at Telephonic Frequencies

By J. A. Fleming and G. B. Dyke *

PART II.—PRACTICAL AND EXPERIMENTAL.

The experiments here described were directed in the first place to determine the value of the apparent conductivity S and the capacity C for alternating E. M. F.s of simple sine-form and frequencies lying between 800 and 5,000—viz., the telephonic range—for various dielectrics taken at stated temperatures. For this purpose we had to develop a method capable of being applied to small condensers or short lengths of cable, these condensers being made up with different dielectrics, and in such form that they could be submitted to a wide range of temperature changes.

As we can generally bring theory and experiment into comparison only in those cases in which we employ simple harmonic currents and voltages, a preliminary problem to which we directed attention was the provision of the periodic E. M. F.s of required frequency, wave-form and value. We possess in the Pender Electrical Laboratory at University College, London, an alternator built by Messrs. Crompton & Company, of Chelmsford, the normal frequency of which is about 900 ∽. The wave-form of the E. M. F. is, however, very far from being a simple sine-curve.

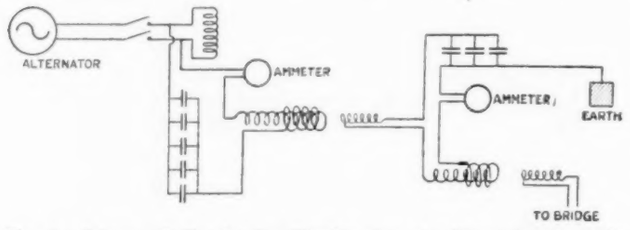


Fig. 2.—Scheme of Circuits for Filtering Out the Harmonics from the Complex Wave-Form of the Alternator E. M. F.

But this proves to be a great advantage, as it enables us to filter out three harmonics having frequencies in the ratio of 1:3:5, each of very pure sine-form. This was done as follows: A number of variable inductance coils were constructed, each consisting of a pair of pasteboard tubes, one of somewhat larger diameter than the other. On these were wound single layers of No. 14 S. W. G. cotton-covered copper wire, and the coils on the two tubes so connected by a piece of flexible wire that when the outer coil was slipped completely over the inner coil the inductance of the two in series was a maximum, but when drawn apart was reduced to a minimum. Three such inductances were constructed, and by means of a divided paraffin paper condenser placed in series with the proper inductance we could resonate the circuit to a frequency n, such that

$$n=5{,}033/\sqrt{CL}.$$

Assuming that the alternator is driven at a speed corresponding to a fundamental harmonic having a frequency of 920 ∽, we can filter out a harmonic of this frequency and also two others, one of frequency $3\times920=2{,}760$, and another of frequency $5\times920=4{,}600$, by placing across the termnials of the alternator one of the above inductances and a capacity tuned to the frequency to be selected. It was found necessary, however, to place a by-pass coil of a certain impedance and no capacity across the terminals

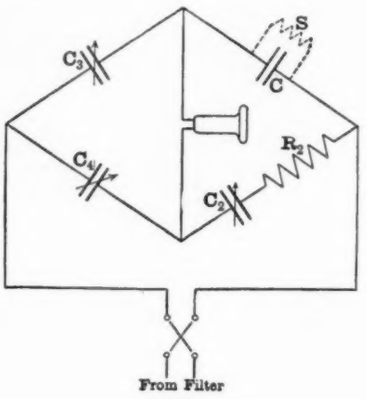


Fig. 3.

of the alternator to provide a complete circuit in which the selected harmonic components can flow. Again, it was found that a single filtration is not sufficient to separate out a perfectly pure sine component. Hence a double filtration was employed. A pasteboard tube of smaller diameter than the inner of the two forming the sliding inductances was wound over with a suitable coil of insulated wire. This was slipped inside the primary sliding inductance and was joined in series with a suitable capacity varying from 0.25 mfd. to 8.25 mfd. to from a tuned secondary circuit. In this secondary circuit was inserted the primary circuit of an air-core transformer, and from the secondary circuit of this latter a pure sine curve E. M. F. would be obtained of a frequency corresponding to the fundamental third or fifth harmonic according to the setting of the condensers and inductance coils. The complete filtration arrangement is shown in Fig. 2.

No oscillograph except the Braun cathode ray oscillograph can be applied to inspect the wave-form, either original or filtered, when the frequency lies between 900 and 5,000. We have, however, quite re-

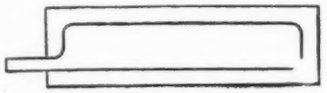


Fig. 4.

cently obtained a large Braun cathode ray tube and suitable electrostatic machine, which has enabled us to determine the wave-form of the E. M. F. curve of the alternator.

Having thus provided ourselves with a pure wave of E. M. F., we proceeded to consider the most useful method of determining the value of S/C.

It will be unnecessary to discuss the various

*Abstract of a paper read before the Institution of Electrical Engineers, London. Continued from the July issue of Telephone Engineer.

methods which have been adopted for determining energy loss in dielectrics. As far as cables and condensers are concerned, the three chief methods are: (1) The wattmeter method, electrodynamic or electrostatic; (2) bridge methods; (3) angular measurement of the phase difference of the condenser current and P. D., or of the complement of this angle.

The wattmeter method is applicable for the most

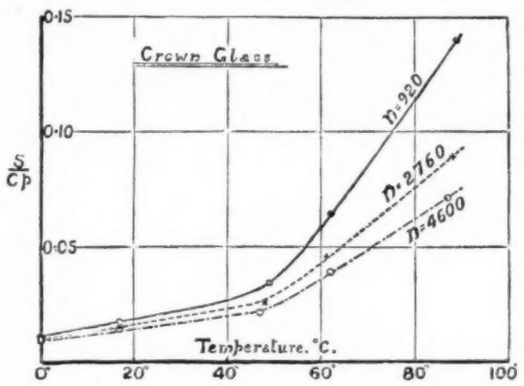


Fig. 5.

part only when the losses are considerable or the voltage high. Moreover, it does not give us the separate values of S and C, but only their ratio. The measurement of very small phase angles, or those closely approaching 90°, present some difficulties, but has been discussed by Dr. Sumpner and Dr. Drysdale.* Hence, after considering all the possible methods, we gave preference to bridge methods. We may assume for the purpose of this measurement that every condenser can be represented as consisting of a perfect capacity, C, shunted by a conductance, S.

Since it is an easier matter to obtain almost perfect non-dissipative condensers of variable capacity, we were finally led, after a good many preliminary experiments, to the following arrangement, constituting a capacity bridge having four capacities—viz., three variable known condensers and one capacity, C,

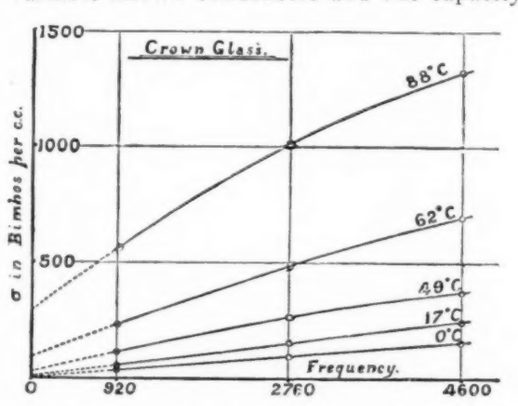


Fig. 6.—Crown Glass. Variation of Conductivity.

to be determined in the four arms, one non-inductive resistance and the unknown condenser conductivity S. The arrangement is shown in Fig. 3, in which C_2, C_3 and C_4 are three air condensers of variable capacity, constructed of fixed semi-circular plates, and a movable set which can be rotated on a shaft carrying an index needle, so as to be included more or less between the fixed plates. These condensers were calibrated by the Carey-Foster method. The resistance R_2 is an inductionless, or practically inductionless, resistance, and C is the capacity of the condenser or cable operated upon, having a dielectric conductance represented by S.

The bridge is connected by one pair of terminals to the secondary circuit of the transformer in the second wave filter above described, by means of which it is supplied with a perfectly pure sine-form E. M. F., having a value of 4 or 5 volts. The opposite corners of the bridge are connected to a sensitive high-resistance head telephone. The condenser or length of cable to be measured is then connected in as the fourth arm of the bridge. The experimental adjustment consists in varying the capacity of the condensers C_3 and C_4 and the resistance R_2 for some selected value of the capacity C_2 until perfect silence is obtained on listening to the telephone. We then have four impedances which are in proportion, viz.:

$$(S+jpC)^{-1}, \left(R_2-\frac{j}{pC_2}\right), -\frac{j}{pC_3}, \quad \frac{-j}{pC_4}$$

Hence the bridge equation is $\left(R_2-\frac{j}{pC_2}\right)(S+jpC)C_3/C_4$.

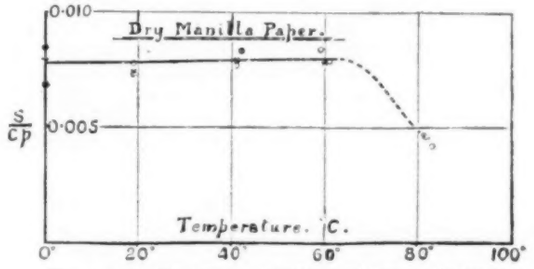


Fig. 7.—Manilla Paper. Variation of Power Factor.

Equating real and imaginary parts we obtain the equations

$$\frac{S}{Cp}=pC_2R_2 \text{ and } \frac{C_3}{C_4}-\frac{C}{C_2}=R_2S.$$

Having thus obtained the value of $S/Cp=x$ from the first of these two equations, it is easy to calculate the separate values of S and C from the equations $C=\frac{C_2C_3}{C_4}\times\frac{1}{1+x^2}$, and hence $S=pCx$. These equations give us S and C in terms of C_2, C_3, C_4 and R_2 and also S/Cp.

Experience showed us that certain precautions are necessary in employing this condenser bridge method. The separate condensers which form the arms of the bridge must not be too near together, as no mutual capacity must exist. Also connections must be made with one wire, so that capacity in these is as far as possible avoided. The body of the observer must not approach too near the condensers when the actual balance of zero-point of sound is being obtained. The method of using two capacities in the ratio arms of the bridge has great advantages over that of using two resistances or inductances

*C. V. Drysdale, "The Measurement of Phase Differences," The Electrician, Vol. LVII., pp. 726 and 783, 1906, and Vol LVIII., pp. 160 and 199.

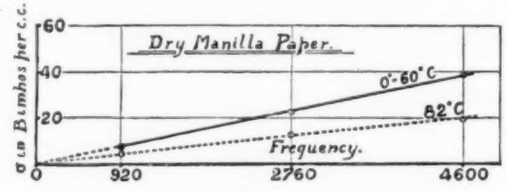
when measuring small condensers or short lengths of cable.

It seems more easy to obtain a pure sine-form E. M. F. with the third and fifth harmonics than with the fundamental, and we have found it easier to obtain good readings with these higher frequencies than with the lower one.

Two other conditions are necessary to obtain consistent readings. It is generally necessary to keep one point on the second filter circuit connected to earth. Also it is necessary always to take two readings in every case with the connections between the corners of the bridge and the secondary circuit of the transformer in the second filter which supplies the bridge current interchanged. This is effected by the reversing switch inserted in the feeder circuit of the capacity bridge shown in Fig. 3. The two readings so taken are denoted by *d* and *r* in the tabular results. The mean of these readings is taken.

As a check we applied the method to test an air condenser made intentionally leaky by shunting it with a known resistance to ascertain whether the results given by it would enable us to separate out the true capacity and conductance of the combination. The alternating current-bridge test gave almost exactly the true capacity for the air condenser as actually determined by the Carey-Foster method, and a close approximation to the true conductance of the shunt of known resistance which was used.

Having thus obtained confidence in the method,



we prepared a number of small condensers having dielectrics respectively of dry Manilla paper, paraffined Manilla paper, celluloid (cinematograph film), gutta-percha, pure india rubber, vulcanized india rubber, ebonite, glass, mica, sulphur, thin slate and other materials. The dielectrics were sheets about 3.5 cm. by 12 cm. in size and 1 mm. or 2 mm. or less in thickness, except the sulphur. The metal condenser plates were usually tinfoil, in the shape shown in Fig. 4, with a lug and with rounded corners and a sufficient number of sheets taken to give a capacity of the order of 0.001 of a microfarad or rather less. In addition to the sheets of dielectric between the metal plates, a considerable thickness of the same dielectric was added outside to carry the lines of force which proceed from the back sides of the outside metal plates. The complete condenser was bound up very tightly between two glass plates with silk tape. The condensers were of such size that they could easily be heated in a small electric oven, which forms a very convenient appliance for keeping such objects at a constant temperature. The condensers could also be sealed up in a glass tube when it was desired to expose them to a low temperature by immersing in melting ice or ice and salt or other cooling mixture.

They were tested as above described at three frequencies, viz., 920, 2,760 and 4,600, and at temperatures varying from —15°C. to 80°C. At these frequencies and over this range of temperature we measured the alternating-current conductivity, the capacity and the power factor of all the condensers. We also measured the same quantities for a dry core paper in-

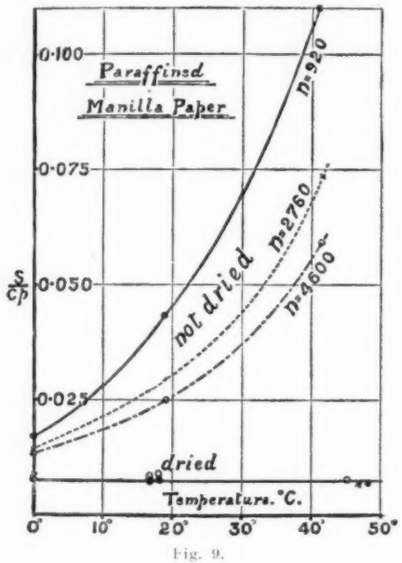


Fig. 9.

sulated telephone cable and for two samples of gutta-percha insulated cable. We also tested certain pure dielectrics, such as paraffin wax and sulphur in the form of thicker flat plates.

As the actual number of measurements on each condenser was very large the authors have only given full details in the case of one dielectric, viz., glass, and in other cases only the mean results of each set of measurements.

The authors proceed to describe the measurements made with each dielectric.

Glass.—The material selected for tests was thin crown glass of the kind used for the covers of microscopic slides. This was cut for us into small sheets

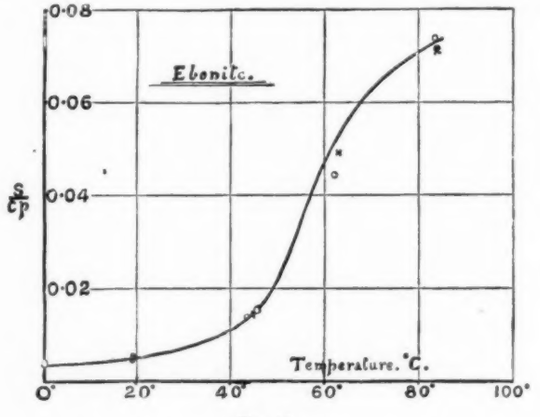


Fig. 10.

12 cm. × 3.5 cm. and built up into a condenser with interposed sheets of tinfoil.

The relation between S/Cp and temperature is shown in Fig 5, and also the variation of S/Cp with frequency and temperature. It is seen that up to about 40°C. S/Cp is nearly independent of frequency,

but that beyond that point the value of S/Cp decreases as frequentcy increases. This clearly points to the fact that the dielectric conductance is a function of the frequency of the form $S=A+Bn$, where A and B are coefficients which vary with the temperature. It is well known that at temperatures much above the normal glass is an electrolyte. Hence it is highly probable that the coefficient A represents that part of the conductance which is electrolytic in nature.

The conductivity (σ) per centimeter cube in bi-

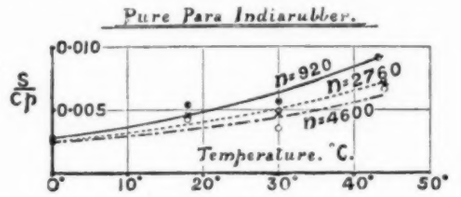


Fig. 11.

mhos in terms of frequency and temperature is plotted in Fig. 6. The reciprocal of σ is the resistivity per centimeter cube. The lines representing the variation of conductivity with frequency are in most cases nearly straight lines, thus showing that σ is a function of the form $\sigma=a+bn$.

The curves show clearly that there are two kinds of conductivity which may be called provisionally the A and B conductivities, both of which increase with temperature, and one of which (the B conductivity) is nearly proportional to the frequency. The A conductivity is possibly electrolytic in nature. The total alternating conductivity is determined by the two together. At high temperature glass has very considerable electrolytic conductivity.

Celluloid.—A condenser was next made up with thin transparent celluloid sheet as used for photographic films, the electrodes being thin copper foil. The capacity at ordinary temperatures was found to be nearly independent of the frequency, but at higher temperatures it decreased slightly as frequency rose. The power factor and conductivity increased rapidly with temperature. This extremely rapid increase excited our suspicions, and we therefore examined the dielectric after it had been heated for some time to 80°C. We found that the celluloid had become deeply discolored in such fashion as to suggest that the copper foil electrodes had acted chemically upon it at high temperatures. Accordingly another condenser was made up with rather thinner transparent celluloid sheet and tinfoil electrodes. No visible chemical action resulted in this case.

Paper.—Some preliminary experiments made with Manilla paper and with ordinary white blotting paper as a dielectric proved without doubt that in the case of fibrous and moisture-absorbing dielectrics the presence of water exercises the greatest effect upon the value of the ratio S/Cp and therefore upon the power factor of condenser made with them. We found that very considerable desiccation was necessary to free such substances as paper from all moisture and obtain the true values of the alternating-current capacity and conductance. As an instance of the effect of this, we studied the dielectric properties of Manilla paper, a tough brownish paper much used for cable insulation. The results on paper carefully dried in an electric oven are shown in Figs. 7 and 8.

Further experiments were made to investigate the effect of moisture. It was found that the interposition of a sheet of mica between two sheets of white blotting paper stopped the direct-current conductance, only careful drying of the paper would reduce the alternating-current conductance. A confirmatory fact, showing that it is moisture which is operative, is that the capacity is much smaller in the case of the dried paper, whereas the interposition of the thin sheet of mica makes very little difference. It is quite clear,

Dielectric.	Frequency n.	Approx. dielectric constant k for alt. electric force of freq. n.	Approx. percentage variation of k per deg. C.	Approx. A. C. resistivity in meg ohms per cm cube for freq. n.	Power factor for frequency n.	$\frac{S}{C}=s$. Ratio
Glass at 17°C...	920	6.60	+0.260	16,900	0.018	104
	2,760	6.50	+0.190	6,400	0.016	277
	4,600	6.50	+0.160	4,000	0.015	433
Celluloid at 15°C.	920	4.02	+0.523	28,000	0.012	66
	2,760	4.00	+0.440	16,000	0.012	179
	4,600	4.00	+0.384	11,500	0.012	363
Dry Manilla paper at 19°C.....	920	1.95	+0.108	140,000	0.007	41.6
	2,760	1.95	+0.106	46,700	0.007	125
	4,600	1.95	+0.112	26,000	0.008	225
Paraffin wax at 17°C.	920	2.36	Nearly zero	2,460,000	0.0003	2
	2,760	2.36		493,000	0.0005	10
	4,600	2.36		296,000	0.0005	17
Mica at 16°C....	920	4.00	+0.060	423,500	0.001	7
	2,760	4.00	+0.060	141,200	0.001	21
	4,600	4.00	+0.060	50,000	0.002	58
Ebonite at 19°C..	920	3.17	+0.360	148,500	0.005	24
	2,760	3.15	+0.310	38,500	0.005	93
	4,600	3.14	+0.290	23,100	0.005	155
Pure indiarubber at 18°C.....	920	2.60	—0.062	145,500	0.005	30
	2,760	2.60	—0.062	54,500	0.005	80
	4,600	2.60	—0.062	35,400	0.004	123
Vulcanized indiarubber at 17°C.	920	2.73	—0.150	343,300	0.002	12
	2,760	2.71	—0.130	103,000	0.002	40
	4,600	2.71	—0.140	38,100	0.004	108
Gutta-percha at 15°C.	920	2.86	+0.105	33,700	0.020	117
	2,760	2.86	+0.124	10,200	0.023	389
	4,600	2.86	+0.133	5,600	0.025	708
Dry slate at 17°C.	920	12.70	*	1,760	0.086	500
	2,760	11.90	*	66	0.082	1,430
	4,600	11.90	*	430	0.074	2,147
Sulphur at 16°C..	920	4.20	Very small	1,480,000	0.0003	2
	2,760	4.20		370,000	0.0004	8
	4,600	4.20		300,000	0.0003	10

*Very small, but not determinate.

ducting particles disseminated through the dielectric, but to an electrolytic conductivity increased by the therefore, that to secure a small value of S/Cp for a paper condenser or paper-insulated cable the paper must be most carefully and thoroughly dried. The conclusion is reached that the increase in alternating conductivity owing to damp is not due merely to con-

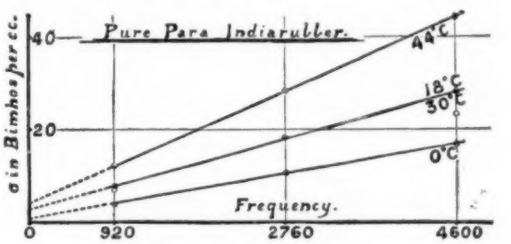


Fig. 12.

presence of moisture particles distributed through the dielectric.

An examination of the same paper when impregnated with paraffin wax was also made. When the paper was dried before impregnation the power factor was constant for all temperatures and frequencies, as in the case of the plain, well-dried unimpregnated paper. If, however, the paper was impregnated before drying it, then the value of S/Cp and of S increased with temperature, whilst S increased as usual with

frequency, and S/Cp diminished with frequency at the same temperature (Fig. 9).

It was then interesting to discover how far the results actually obtained in practice with paper as a dielectric agree with the foregoing conclusions. Accordingly a length of paper-insulated dry-core tele-

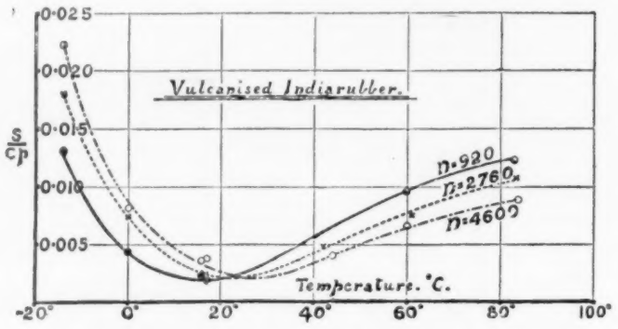


Fig. 13.—Vulcanized Indiarubber. Variation of Power Factor.

phone cable was obtained from the British Insulated & Helsby Cable Company. The conductance was found to be almost independent of temperature at the lowest frequency, but rose with frequency for the same temperature and decreased slightly with rise of temperature at the higher frequency. The value of S/Cp and of the power factor was constant and independent both of frequency and temperature, and was less than one-third of 1 per cent. The fact that S/Cp is even less than for dry Manilla paper is accounted for by the air-spaces in the paper insulation of the dry-core cable.

Ebonite.—The curve representing the variation of

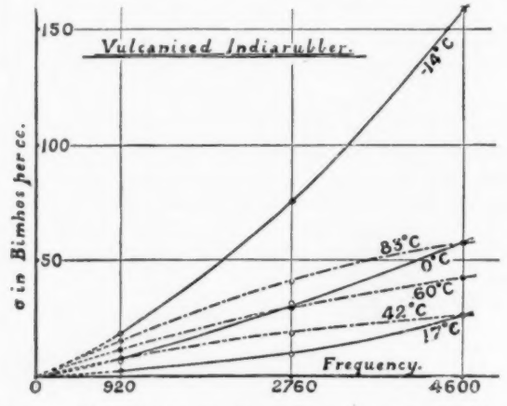


Fig. 14.—Vulcanized Indiarubber. Variation of Conductivity.

S/Cp with temperature for ebonite is given in Fig. 10. It rises rapidly with temperature, but is the same for the three frequencies.

Pure Indiarubber.—The results are shown in Figs. 11 and 12.

Vulcanized Indiarubber.—Sheets of good vulcanized Indiarubber, obtained from the India Rubber, Gutta Percha & Telegraph Company, were formed with tin foil into a condenser. Fig. 13 and Fig. 14 show the results for this material. In connection with the abnormality of vulcanized indiarubber in regard to its apparent decrease in dielectric constant with rise of temperature, it may be recalled that the same substance is abnormal with respect to the effect of heat upon it, in that it contracts with rise of temperature instead of expanding. It would be interesting to learn if any other observers have noted a negative temperature coefficient for the dielectric constant of vulcanized indiarubber.

(To Be Concluded.)

Louisville Rate Ordinance Declared Valid.

The official mandate in the case of the City of Louisville against the Cumberland Telephone and Telegraph Company, involving the validity of the ordinance regulating telephone rates, was received by First Assistant City Attorney Huston Quinn from the clerk of the United States Supreme Court. It is set forth in the mandate that the ordinance is valid. The injunction preventing the enforcement of the ordinance, granted by Judge Walter Evans, was ordered set aside and adjudged to have been an error. Nothing looking to the enforcement of the rate-regulating ordinance can be done until the return of Judge Evans in September. Then Mr. Quinn and City Attorney Blakey will appear with the mandate before Judge Evans and request him to sign an order permitting and requiring the Cumberland Telephone and Telegraph Company to refund all money collected by it in excess of the amount allowed by the ordinance since an injunction has been in effect. The average reduction in telephone rates provided for in the rate-regulating ordinance is about $1 a month to 10,000 subscribers. Mr. Quinn has estimated that the Cumberland company has collected about $200,000 more than it should have, under the ordinance. He said he believed all this money would be recovered. Court costs amounting to about $20,000 are charged against the Cumberland Telephone and Telegraph Company as a result of its long litigation with the city. The bill of the clerk of the United States Supreme Court, growing out of the case, amounts to $1,400.

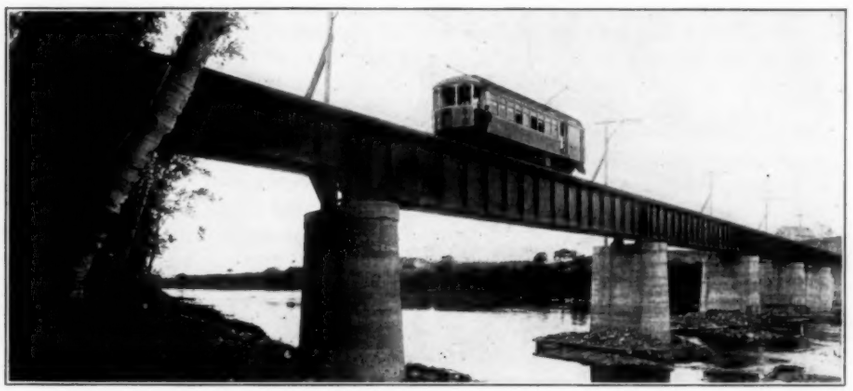
Michigan Commission News

The Michigan State Telephone Company will have complete control in the future of the portion of the state bounded by Imley City and Lapeer on the north, by Flint and Lansing on the west and by an arc of a circle from Lansing to the state line on the south. No other company may establish an exchange and expect long-distance service until the Michigan State Company decides that it will not establish an exchange at the point under consideration. After that the rule applies that an independent shall have long-distance service as in other portions of the state.

The petition of the Bell Telephone Company and the Home Telephone Company, the independent company of Detroit, for permission to consummate a deal whereby the Bell Company will absorb the independent lines has been approved of by the commission, which states, in its written opinion, that such a merger will be to the interests of the public, as well as of the stockholders. The majority of the capital of the Home Company is held by St. Louis men.

Good morning! Have you used Pear's soap? You remember that ancient wheeze. Everybody knew it by heart, so Pear's stopped advertising. They lost, it is said, a million dollars of business the next year. Don't stop.

DEPARTMENT of RAILWAY TELEPHONES



Twenty-six Years on the C., St. P., M. & O.

George Boyce, Supt. of Telegraph

THE Chicago, St. Paul, Minneapolis and Omaha Railroad operates some 1,680 miles of road. Like a great many other railroads, it goes farther than its name indicates; for while Minneapolis is farthest north in its title, the road does not hesitate to run as far as Duluth. Just south and east of that city it scatters and runs in all directions, striving to take in as many of the northern Wisconsin lumber camps as one railroad can reasonably be expected to. Incidentally and quite unintentionally it covers a lot of good hunting and fishing territory. The fragments reunite at Hudson, Wis., and from there the main branch runs quietly down through St. Paul to Omaha.

George Boyce, C., St. P., M. & O.

At St. Paul is the office of the superintendent of telegraph—George Boyce by name, a man of forty-four years, twenty-seven of which have been spent in acquiring railroad experience along telegraphic lines. Mr. Boyce was born March 2, 1868, near Parkhill, Ontario. Parkhill is in that part of Canada's big province that extends between Lake Erie and Lake Huron, and is only a few miles from the latter. It is a town of about 2,000 souls, a station and telegraph office on the Grand Trunk Railway. There it was, in that little Canadian railroad office, that young Boyce learned telegraphy by the good old process of listening to the rattle of the sounder. He had finished the common and high school courses of the district, and August 31, 1885—at the early age of 17 years—became a full-fledged operator.

In this position he continued with the Grand Trunk for the whole of a year and seven weeks. Then he got restless. Park Hill was very small; and besides he wanted to see something of the states. He quit the Grand Trunk October 23, 1886.

This country has always been glad to welcome good men from across the line. Eight days later, and just fourteen months from this official entrance to railroad work, Boyle became a telegrapher for the Chicago, St. Paul, Minneapolis and Omaha Railway.

That is the only change of employers he has ever made. He had every opportunity to learn the details of which he is now master, and went through practically all the jobs subordinate to his present office. From the key he went to the wire chief's desk and was initiated into the mysteries and profundities of telegraph circuits. He learned what could happen to telegraph lines and apparatus, and what to do when it did happen. Best of all, he found how to keep it from happening—which is the real secret of efficiency. All this was valuable experience indeed for a future superintendent of telegraph.

Having mastered the circuits, he was next made acting chief telegrapher. A little later he became secretary to the superin-

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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tendent, then chief clerk, then signal engineer. And April 1, 1909, he was appointed to his present position—superintendent of telegraph and signals of the Chicago, St. Paul, Minneapolis and Omaha Railway. It was April fool's day; but the appointment failed to fool anybody, for his friends and fellow workers all knew it was coming sooner or later.

George Boyce is an active member of the Association of Railway Telegraph Superintendents, and last year was on the committee on miscellaneous matters.

Telephones for St. Louis Southwestern Railway

One of the principal railroad systems of the Southwest—that part of the St. Louis Southwestern Railroad Company's lines, commonly known as the Cotton Belt Route—has lately joined the ranks of those using the telephone for dispatching trains. To this end, an order has been placed with the Western Electric Company. The apparatus to be used is the No. 101-B selector set, containing the standard Western Electric No. 50 type selector, and twenty-four way stations will be so equipped along the line which extends from Jonesboro, Ark., to Illmo, Mo., a distance of nearly 140 miles. The dispatcher is to be located at the latter point. Besides the telephone equipment, both signaling and talking, power equipment is to be furnished for generating the current to be used for signaling and talking. This consists of a single phase motor direct connected to a direct current generator, a power switchboard with accessories and 90 chloride accumulators. A wire chief's testing panel will also form a part of the equipment.

Missouri Commission News

The Kinloch Telephone Company, through H. Linton Reber, vice-president and general manager of the company, withdrew its previously expressed objections to the Public Service Commission taking vouchers and other documents of permanent record from the company's office. The commission wanted to examine the documents in its investigation into the Kinloch Company's affairs. Reber told the commission the Kinloch officials would permit the removal of any documents but those which could not be replaced or those necessary to the conduct of the business.

As the documents Reber said he would not permit the commission to take out of the Kinloch office were maps and drawings which the commission did not want removed, an understanding was reached.

Oklahoma Commission News

A complaint has been filed with the Oklahoma Corporation Commission alleging that the Home Enterprise Telephone Company, of Woodward, is not giving the patrons of the former company adequate long-distance service under the recent order of the Corporation Commission requiring physical connection. The Fort Supply Telephone Company is the complainant and alleges that one wire has been connected up under that order but that it is not enough to handle the business and the Fort Supply Company now wants a second wire. The Home Enterprise Company makes long-distance connections with the Pioneer Telephone and Telegraph Company at Woodward and with the Southwest Telephone Company at Higgins, Texas.

That telephone and telegraph companies will be obliged to furnish emergency service to state and county officers under conditions warranting it, is the final order of the Corporation Commission. The new ruling will be effective September 20 and provides that such service shall be furnished the governor, members of the supreme court and criminal court of appeals, attorney general, corporation commission, adjutant general, district judges, sheriffs, members of the legislature when in session, and federal judges and United States marshals.

Construction Materials and Costs

By R. E. Chetwood*

THE appraisal of the plant of the Western Union Telegraph Company made in the year 1910 by the engineering firm of Westinghouse, Church, Kerr & Company showed that the largest percentage of the telegraph company's investment was in its outside plant, consisting of pole lines, wires, conduits and cables. As the largest part of the telegraph company's investment is in this type of plant, it is, of course, very necessary and advisable that the construction of the outside plant should be of proper character and economical in cost.

Previous to about two years ago, the telegraph company in purchasing poles for use in the construction and maintenance of its pole lines obtained them on specifications which specified a minimum diameter at the top, but did not specify any minimum diameter at the butt. The large telephone companies throughout the country were purchasing their poles on specifications which provided minimum diameters at both top and butt, with the result that the telephone companies obtained the best of the poles and the telegraph company obtained poles which were inferior to those obtained by the telephone companies in that on account of small butt dimensions they were not of sufficient strength, and had not sufficient length of life. One of the first changes in construction materials was the putting into effect of specifications for poles whereby the poles were classified according to the wire loads which they would be called upon to carry and whereby the different classes of poles were required to meet certain minimum dimensions at the top and six feet from the butt. Under the existing specifications all chestnut poles, all Eastern white cedar poles or 20 wire and over capacity, all redwood and all Western cedar poles of over six wire capacity must meet certain minimum dimension requirements at the top and at a point six feet from the butt. This requirement of a minimum dimension at a point six feet from the butt has resulted in obtaining poles of greater strength for the load which they will be called

*Abstract of paper read at the annual convention of the Association of Railway Telegraph Superintendents, New York, June 4, 1912.

upon to carry, in the construction of pole lines which will resist storm damage to a greater degree than formerly and in the use of poles which will not require replacement or resetting as early as was the case with poles purchased without any butt requirement.

In order to standardize the size of crossarms and to obtain the benefits of the economies incident thereto, the subject of the economical sizes of crossarms to use was carefully considered. The costs of the various sizes of cross arms were obtained, after which their costs in place on the pole were determined, and it was found economical to standardize only the 6-pin and 10-pin crossarms. The standardizing of such sizes has resulted in a reduction in the value of the stock of crossarms it is necessary to carry for construction and maintenance purposes, and has resulted in more economical pole line construction, the cost per pole per pin space having been appreciably reduced.

I mention above that the six-pin crossarm was eight feet in length. This is our present standard. We are contemplating, however, a change whereby the six-pin arm will be six feet in length, the pin spacing being the same as is the case with the present ten-pin arm. The use of a six-foot six-pin cross arm instead of an eight-foot six-pin arm will also result in stronger construction. The existing eight-foot arm will stand an ultimate load per pin of approximately 525 pounds, while the six-foot crossarm will stand an ultimate load per pin of approximately 690 pounds.

Pins and insulators have received considerable study during the past two years and changes in both have been made. The result of tests showed that the old type of steel pin would deflect approximately .7 of an inch under a strain of approximately 600 pounds. This was considered to be too great a deflection for such a strain, with the result that the pin was redesigned, distributing the metal in the pin where it would do the most good, and has resulted in the present pin, which requires a strain of 1,000 pounds to produce a deflection of approximately .7 of an inch. It will be seen, therefore, that the present pin is approximately 400 pounds or approximately 70 per cent stronger than the old pin.

A large number of complaints had also been received regarding nuts coming off and pins pulling out of crossarms. This was investigated and it was found that the nuts on the old pins were not of proper thickness, were of poor material and fitted the pins too loosely. In the case of the new pins the nuts are thicker, they fit the pin better, and in addition the washer has one side cut off so that a nail can be driven in alongside of the nut and keep it from loosening or unscrewing. These changes, together with a very careful inspection of all pins before shipment should result in stronger and better construction and fewer maintenance troubles.

So many complaints were received regarding the so-called Barclay insulator that an investigation and study as to the proper type of insulator was started in the fall of 1910. The results of investigation and tests showed that the complaints regarding the Barclay type of insulator were well founded and that wires were likely, under a slight upward pull, to come off the insulators. It was also found that the insulators were not mechanically strong. Several new designs of insulators were made, following somewhat the old Western Union type of standard insulator and experimental insulators were made up from these designs. As a result of tests on these different experimental insulators the present insulator, which is being furnished on requisitions, was decided upon. This insulator is considerably better from an insulation standpoint than either the Barclay or the old Western Union insulator, furthermore, it is mechanically stronger than either of these insulators. From an insulation standpoint, it is theoretically 75 per cent more efficient than either of the other two types. In regard to the mechanical strength of the new type of insulator, a large number of tests were made comparing its strength with those of the other types. We shall still continue to try and improve the insulator in every way possible, both as regards its insulating qualities and its mechanical strength.

In the construction of underground conduit, the telegraph company has largely made use of iron or mild steel pipe. In the early days when the first conduits were constructed, wrought iron pipe was used. In the last few years mild steel pipe has been used for the reason that practically all pipe now manufactured is mild steel rather than iron, steel pipe costing less to manufacture. The use of iron or steel pipe as far as I have been able to determine, was largely on the basis that it prevented electrolysis trouble on the cables. This is somewhat true, as it did, to a certain extent, prevent cable troubles from electrolysis, but it transferred the electroylsis from a cable to the iron pipe with the result that the iron or steel pipe were gradually eaten away. The use of iron or steel pipes on account of electrolytic troubles was, therefore, only postponing the evil day and making it necessary at a later date to replace not only the pipes, but also the cables, for after the pipes were gone then, of course, electrolysis of the cables commenced. The use of iron or steel pipes for underground conduits is also expensive, inasmuch as the first cost of the pipes, not including labor, etc., for laying them, was from 20 to 25 cents per foot, depending upon the point where the pipes were to be laid, and the freight and other charges incident to getting the pipes on the ground, while the first cost of tile ducts or creosoted wood ducts is approximately one-fourth of these figures. In the preliminary specifications that have been issued, as far as practicable, the use of tile or creosoted wood ducts has been specified and the use of iron or steel pipe restricted to laterals or at other places where peculiar conditions make iron or steel pipe advisable and economical.

There have been no very great changes in the character of the cables used, except, of course, to provide that all cables, whether rubber or paper insulated, shall be composed of twisted pairs. All new cables purchased during the past two years have, therefore, been of proper design for telephone service. The constantly increasing use of telephone circuits in railroad work, togther with such uses as the telegraph company makes of telephone circuits, have made it necessary that all cables shall be composed of twisted pairs. In regard to paper-insulated, lead-sheath cables, the specifications now require cables of lower mutual and grounded capacity than was formerly the case, which, of course, results in cables of higher and better transmission efficiency, both from a telephone and telegraph standpoint. The specifications have also been changed to provide for cables

in which the conductors are insulated with two instead of three wraps of paper. In this way we are able to obtain a larger number of conductors in the same sized sheath than was the case with cables manufactured under the old specifications. The new cable specifications provide for approximately 280 conductors of No. 16 B. & S. gauge or approximately 180 conductors of No. 14 B. & S. gauge in a sheath not over 2⅝ inches in outside diameter, whereas the old specifications provided for only approximately 200 No. 16 B. & S. gauge conductors or 100 No. 14 B. & S. gauge conductors in a 2⅝-inch sheath. In the new specifications for cables provision is made for composite cables, namely cables which contain different gauges of conductors, such as a certain number of pairs of No. 14, 16 and 19 B. & S. gauge conductors. In this way it is possible to provide the most economical and proper gauge of conductor for the different classes of service to be handled through the cable. The changes in the paper insulated lead sheath cable specifications have resulted in reduced conduit and cable costs in that fewer ducts and fewer cables are now required in order to provide for a given number of circuits.

Other materials which have been changed during the past two years are largely such as are known as pole line hardware, and in addition, such materials as guy strand and guy rods, etc.

In the case of guy strand, it was formerly the practice of the telegraph company to use two sizes, one size from actual tests had an average breaking strength of about 5,000 pounds, while the other size from actual tests had a breaking strength of approximately 7,600 pounds. As the strength of the guy strand should be proportioned, as far as practicable, to the load or strain which it will be called upon to carry or sustain, it was decided after careful consideration to use guy strands of four different strengths, each one of which would be used under definite conditions of load or strain. These guy strands are known as 4,000, 6,000, 10,000 and 16,000 pound strands respectively. Their actual breaking strengths are as follows:

Four thousand-pound strand breaks at approximately 4,800 pounds.

Six thousand-pound strand breaks at approximately 6,500 pounds.

Ten thousand-pound strand breaks at approximately 12,400 pounds.

Sixteen thousand-pound strand breaks at approximately 20,000 pounds.

With these different sizes of strands and with different sizes of guy rods, it is of course, seen that pole lines can be guyed according to their loads or strains at a much smaller cost than formerly.

In regard to guy rods, the telegraph company formerly used two sizes, namely a 4-foot rod and a 6-foot rod. Both rods were ¾-inch in diameter and were approximately of 18,000-pound strength. The 4-foot rod was usually used with the strand which broke at approximately 5,000 pounds, and the 6-foot rod was usually used with the strand that broke at approximately 7,600 pounds. It will be seen, therefore, that in many cases a guy rod with a breaking strength of approximately 18,000 pounds was used with a guy strand having a breaking strength of approximately 5,000 pounds.

The new type of guy rods which we are now using are 6 feet long by ½ inch in diameter, 8 feet long by ⅝ inch in diameter and 10 feet long by 1 inch in diameter. The 6-foot rod has a breaking strength from actual tests of approximately 10,000 pounds, the 8-foot rod has a breaking strength by actual tests of approximately 15,600 pounds, while the 10-foot rod by actual tests has a breaking strength of approximately 35,000 pounds. The 6-foot rod is used with 4,000-pound strand, the 8-foot rod is used with 6,000-and 10,000-pound strand, while the 10-foot rod is used with 16,000-pound strand. It will be seen from these breaking strengths of rods and guy strands that the construction as regards strength is better proportioned than was formerly the case. Changes have also been made in the number of guy clamps that shall be used with different strengths of guy strand, so that the holding power of the guy clamps is properly proportioned to the strength of the strand and the guy rod.

Other changes relate mostly to the tools used in construction and maintenance work.

In regard to construction methods, a large number of changes have been made. The changes relate mostly to pole line construction. In the new pole line specifications that have been recently issued you are aware that the length, class of poles and the number of poles per mile in any line depends upon the ultimate wire load to be carried by the line. This, of course, is the logical method of constructing a pole line, namely, first determine the probable wire load and then construct a line which will most economically and safely carry that load.

Regarding the spacing of poles, the average spacing, or the number of poles per mile, was determined from a consideration of wire loads, pole line costs and the transmission efficiency of the circuits to be carried on the pole lines. The number of poles per mile decided on for the different classes of pole lines were those that theory and experience showed to be correct in order to give the required strength for the various loads, allowing, of course, for a proper amount of decrease in strength on account of decay of poles at the ground line. A required strength of pole line construction can, of course, be obtained by using a larger number of weaker poles or a smaller number of stronger poles. The problem then was to get a line of proper strength at a minimum cost and without decreasing the transmission efficiency of the circuits to be carried on the line below advisable limits. You, of course, realize that the greater the number of poles per mile the lower the insulation of the line wires during wet weather. The insulation per mile of wire on a pole line containing forty poles to the mile, is, under the same conditions, twice as great as the insulation per mile of wire on a pole line containing eighty poles per mile. As the insulation per mile of wire is a big factor in determining the telegraphic and telephonic efficiency of circuits, it is, of course, desirable to obtain as high an insulation as is practicable by using as small a number of poles per mile as will give sufficient strength. The pole spacing decided on, namely 30 poles per mile for 6 wires or less, 41 poles per mile for from 7 to 60 wires, 53 poles per mile for from 61 to 70 wires, and 59 poles per mile for from 71 to 80 wires, have been found to be the best, taking all factors into consideration.

One feature of pole line construction and recon-

struction on which considerable emphasis has been placed is the matter of the height of poles to be used. From every standpoint it is advisable to keep the height of poles as small as practicable. The smaller the height of the line, the stronger it is. Furthermore, when necessary to guy poles the strengths of the guys are much greater for the same amount of lead, if the poles are short ones than if the poles are high ones. A lead of 5 feet for a side guy in the case of a 20-foot pole gives a much more efficient guy than a lead of 5 feet in the case of a 30-foot pole.

The use of short poles is also most advisable from a cost standpoint. It reduces considerably the first cost and the annual cost of a pole line. It formerly was the practice of the telegraph company, in many cases, to set poles higher than was actually necessary so that at a later date the poles could be cut off and be reset. It was thought to be an economical practice, but in reality it was not economical. Mr. Chetwood then cited figures to show that it is economical, not only for the telegraph company, but also for the railroad company, to use in pole line construction and reconstruction as short poles as is practicable.

The figures show that there is a saving in the cost of material, a saving in the cost of unskilled labor and a saving in the cost of skilled labor by using a 20-foot pole instead of a 25-foot pole. The economy of using short poles can readily be calculated for other classes and lengths of poles and it will be found to be the economical thing to do, not only from the telegraph company's, but also from the railroad company's standpoint.

That the efforts to reduce the height of poles used in pole line construction and reconstruction have been somewhat successful is shown by the fact that in the year 1909 only 11 per cent of the chestnut poles purchased were as short as 20 feet in length, while in the year 1910, approximately 28 per cent and in the year 1911 approximately 48 per cent of such poles were 20-foot poles.

In the guying of pole lines many changes have been made. It was formerly the practice on gradual curves to make each pole a corner pole and to guy each pole. In the new work we have required that along gradual curves the line shall consist of corners and straight section. In that way we have reduced the amount of guying necessary and have also provided a stronger line.

In wire work certain methods have been changed. As far as practicable copper wires are now placed at the top of the pole and iron wires below the copper wires. The copper wires are being placed so that they are adjacent and can be transposed not only for physical telephone circuits, but also to create phantom telephone circuits. The methods of stringing and tying copper wire have also been changed. It is now required that copper wire be given a definite sag depending upon the span length and the temperature at which it is being strung, while previously it was the practice to string the copper wire without much regard to temperature and span lengths. Previous practice resulted in many cases of wire troubles due to the wire breaking during cold weather, the copper wire having been strung too tight. By following the specification requirements as regards sag, most of the troubles due to wires breaking on account of cold should in the future be obviated.

The method of tying the copper wire to the insulator has also been changed. Under the present method, one end of the tie wire is carried over the line wire, while the other end is carried under before they are crossed and the wraps commenced. With this method of tying there is no tendency to unwrap in case of strains on the wire, as under a downward strain one end of the tie tends to tighten up, while under an upward strain the other end of the tie tends to tighten.

The use of a tie wrench also resulted in a large number of line troubles. The hard drawing of copper wire produces only a skin effect and the slightest nick or scratch or kink in the line wire reduces the strength from that of hard drawn copper to that of soft drawn copper. The use of a tool in making the wraps often scratched or nicked the wire, reducing its strength approximately 50 per cent. The present method of tying requires 5 hand-made wraps, no tool of any sort being allowed. In order that the wraps may be made by hand the length of the tie wire has been increased considerably over that formerly in use.

In the recent pole line specifications the method of attaching double arms to poles has been changed, and furthermore the use of double arms has been restricted as far as is practicable in order to increase the transmission efficiency of the telegraph and telephone circuits carried on the pole lines. Each insulator during wet weather is a point of leakage and part of the low insulation on telegraph and telephone circuits in the Western Union plant has been due to too great a use of double arms at points where their use was not a necessity.

In construction and reconstruction work strong effort is being made to keep the amount of rubber cable used down to a minimum. There is nothing more injurious to telegraph or telephone transmission than the insertion in such circuits of long lengths of rubber cable. It will always be necessary, of course, to carry wires in and out of railroad stations by means of short lengths of rubber cable. These lengths, however, should be made as short as practicable, for, although any one length may not seriously affect transmissions, still the presence of a large number of small lengths in any one circuit is cumulative, and in a circuit between New York and Chicago the total amount of rubber cable in circuit is a serious detriment to telegraph and telephone transmission.

While not absolutely correct the KR law is approximately correct as regards the efficiency of different types of cable from a telegraph transmission standpoint. In other words, the telegraphic efficiency of cables depends on the total resistance of the conductor in ohms multiplied by the total grounded capacity of the conductor in microfarads. The higher the product of the resistance and capacity of a conductor the less efficient it is from a telegraph transmission standpoint.

From measurements made on rubber insulated cable and on paper insulated cable it has been found that the average capacity to ground per wire per mile in the case of rubber insulated cable is approximately .62 microfarads, while in the case of paper insulated cable the average grounded capacity per mile per conductor is approximately .10 microfarads. Comparing No. 14 B. & S. gauge rubber insulated cable with No.

14 B. & S. gauge paper insulated cable, it is seen that 1 mile of rubber cable is as serious a detriment to telegraph transmission as approximately 2½ miles of of paper cable, or 10 miles of rubber cable affects telegraph transmission approximately as seriously as 25 miles of paper cable. Comparing No. 14 B. & S. gauge rubber insulated cable with 210-pound copper wire the capacity to ground per mile of which is approximately .015 microfarads, it is seen that 1 mile of rubber cable is as serious a factor in telegraph transmission as approximately 130 miles of 210-pound copper wire.

Dignity of the Telephone

A crowd of reporters were besieging the office of a prominent corporation official one afternoon to get his views on an important piece of information. The official had no intention of seeing them, so slipped away to his home. The newspaper men, who represented papers from all over the United States, followed him and endeavored, in vain, to interview this reticent person. Not one succeeded in getting admission beyond the front door. The official refused, absolutely, to grant a single interview, and he meant it, says the *Detroit Saturday Night*.

And yet there was one New York newspaper which printed next morning a long and interesting interview with the corporation official, giving his views on the important piece of information in great detail. This interview was authoritative and had been obtained as follows: The editor of this journal had had his Pittsburg correspondent call up the official by long-distance telephone, and when word was brought that "Long Distance" wanted him he got out of bed. The dignity of the approach was such that he talked freely.

In these days competition is keen and there are so many ways of approaching people that the man who doesn't want to be approached has grown very wary. He detects the simple circular and the imitation letter in his mail at a glance. The signs and hand bills which follow him as he walks along the street he usually ignores, unless they make a subconscious impression on him. He avoids even the most insistent salesman, and is never "at home" to the reporter who may be unwelcome.

But everybody is always "at home" to the long-distance telephone.

There is nothing hackneyed about this means of approach. It has not been worked to death. Further, it always implies business of importance. When a man is called by long-distance telephone he may rely on not being asked to buy a nail file or a packet of pencils.

The man who has something to sell, whether it is information, newspaper space, or goods, compliments his potential customers by calling on them that way. The most tactful personal letter may be regarded as an intrusion, but never the toll call, and the person called realizes this point in such a way that it reflects to the advantage of the person calling.

Let it be assumed, in the case of a business office in a city, that a large portion of the business is done with half a dozen customers scattered over territory ten or twenty miles from the office, but conveniently reached by trolley lines—an area, say, of about seven hundred square miles.

To visit these customers a salesman will take certainly half a day, if he is lucky in his trolley car schedules; probably a whole day. To this cost of one day for a salesman in selling goods, there must be added carfares and expenses. Furthermore, every customer who happens to be out, or is too busy to talk, costs just as much pro rata as those who are successfully interviewed.

Or consider these six customers the same distance in the country where trolley lines do not run, where for getting around a team must be used, or an automobile. Now the cost of getting at these customers is easily twice what it was in the other case—supposing that the visits can be made under any circumstances. As a matter of fact, these conditions imply that there must be seasons in the year when the state of country roads makes it impossible to keep in touch with such trade.

Here, then, we have a simple problem in arithmetic to be solved by the merchant who wants to sell goods to such customers as are described. Is it worth while? The business man must go largely, nay, entirely, unless some part of his business is swayed for sentimental reasons—by cost. If the working at these outlying customers through his sales force eats up the profits to be accrued, he must let them alone. The pressure of other matters may prevent his laying out his sales force to take a chance on it, or he may come to the conclusion that the costs are prohibitive.

Now, with the long-distance telephone, practically every customer of this sort can be reached at an expense not greater than those of trolley fares. A salesman, who might take from half a day to a day to visit these customers in person, with the chances of missing some of them in spite of the expense, can cover the whole outlying region of them in a couple of hours. And those he doesn't succeed in reaching cost him nothing.

The directness and efficiency of the canvass are as great as in a personal visit, and the dignity of the approach certainly impresses the customer—just as the salesman knows that he himself would be impressed if he were in the customer's place.

C. B. & Q. Extending Its Telephone Lines

The Chicago, Burlington & Quincy Railway Company recently placed an order with the Western Electric Company for apparatus to be used in extending its telephone train dispatching circuits. The successful operation of the present lines and the economy resulting therefrom has been the incentive for the extension.

At present, there is a train wire, operated by special No. 102 type selector sets of Western Electric manufacture, from Kansas City, Mo., to Napier, Mo., with the train dispatcher at St. Joseph, thus working the circuit from St. Joseph to Kansas City on one end and from St. Joseph to Napier on the other. The extension will bring the train wire into Council Bluffs, Iowa, from Napier. This branch is now operated by telegraph and it will be simpler to operate the entire line by telephone, than by using a combination.

Fourteen special No. 102 type selector sets will be installed in way stations along the line to Council Bluffs. The dispatchers will be located at St. Joseph. The new line is approximately 95 miles long.

Some men advertise once and then sit back and wait for the rush of business. Most men read an ad once and then sit back and wait for the next ad. If there's no next ad, there's mighty little business.

Of Interest to the Trade

By A. L. Haase

New Stromberg Company.

The officers and directors of the Stromberg-Carlson Telephone Manufacturing Company are formulating plans for a new corporation to take over and continue the business of the present company, which is being liquidated. The new corporation will be owned by substantially the same people that controlled the old concern.

According to the proposed plans, such portion of the present plant, machinery, merchandise, etc., as can be advantageously utilized, will be taken over, thereby making the smaller plant as well equipped as the larger one to meet the requirements of the trade. During the liquidation of the old corporation, business will be carried on as usual, the company being prepared to execute all orders as promptly and efficiently as ever.

J. G. Ihmsen, general manager of the Stromberg-Carlson Company, has notified the company's customers of the new plans outlined above. He has sent out the following letter to the trade:

In order that you may have direct and accurate information in regard to the affairs of the company we desire to make the following statement:

We have realized for some time that we had too large a plant and investment to carry on profitably the business which we have been doing, and therefore have been planning to liquidate a portion of our investment.

Accordingly, at a meeting of stockholders held July 29th it was decided to liquidate the present corporation. This action is taken, not because of any financial trouble, for we have no indebtedness of any sort, but for the reason above stated.

It is proposed and plans are already under way, to form a new corporation which will take over and continue the business of the old company, taking over also such portion of the plant, machinery, merchandise, etc., as can be advantageously utilized, such new corporation to be owned by substantially the same people and to be as well equipped to meet our customers' requirements promptly and efficiently as we have in the past.

In the meantime we are prepared to execute your orders, furnishing the same high-class apparatus as heretofore.

Mr. Ihmsen said that the stockholders would receive the first liquidation payment as a dividend of 38.58 per cent on the preferred stock. Of this amount 28.58 per cent covers the full accumulated back dividends on the preferred and 10 per cent toward liquidating the par value of the preferred stock.

The assets of the corporation are large. According to the last annual report, December 31, 1911, they were $3,171,723.07. Of this amount only $1,950,000 is necessary for the liquidation of the preferred stock and back dividends.

Assets consist of $600,000 cash, property at Atlanta for which the Bell interests bid $500,000, bills and other quick assets of $400,000, and merchandise of $750,000, making a total of $2,250,000, according to a broker figuring on the proposition.

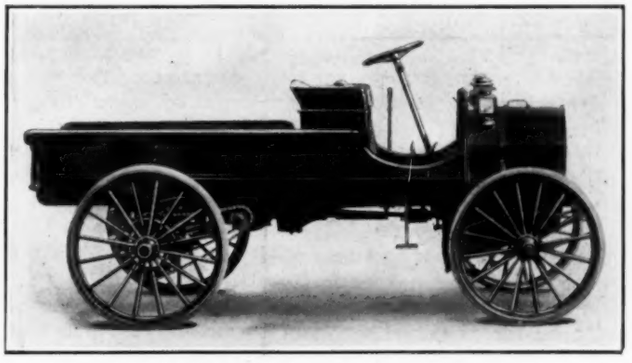
After deducting $1,900,000, the amount necessary to liquidate the preferred claims, there is a balance of $300,000 left for the common stockholders in addition to the plant and machinery. The last balance sheet of the company showed real estate, buildings, plant, machinery, etc., valued at $974,602.21. It is this outlook that keeps the common stock strong at the advance it scored after liquidation was decided upon by the Stromberg stockholders.

It is gratifying to note that this old company, which is so well and favorably known both by its product and its method of conducting business, is not to pass out of active affairs in the independent field, but is to continue as before. The independent cause could ill afford the loss of this prominent firm, which has done so much for the betterment of telephone conditions, and we believe that this step speaks not only for the future success of the Stromberg Company but for telephony in general. All danger of the company being eliminated is dispelled by this action, which seems to be very satisfactory to all concerned.

New Chase Motor Truck.

To meet the demand for a light motor truck of 500 pounds capacity, at a price of $500 dollars, the Chase Motor Truck Company, of Syracuse, N. Y., has put a truck on the market that is well worthy of the consideration of the telephone man. Being pioneer in the manufacture of motor trucks, the Chase Company is well qualified by experience and financial backing to produce a successful vehicle of this type.

The new truck, Model M, as it is listed by the makers, is driven by a 12-horsepower, two cylinder, Chase motor, of the two-cycle type, air-cooled. This motor is mounted vertically under the hood and therefore is easily accessible. In common with most engines of the two-cycle type, built at the present day, no lubricator is used, the lubricating oil being mixed in the same tank with the gasoline. This minimizes lubrication troubles, and makes



New Chase Light Delivery Truck.

the machine as nearly fool-proof as it is possible to build it. Being of the two-cycle type, there are but a minimum of parts to cause trouble.

Ignition is by high tension magneto in place of the unreliable batteries used heretofore in low priced cars. A planetary transmission is used, which makes the car easy to operate and is without danger of stripped gears, a trouble commonly met with in sliding gear transmissions.

Double side chains transmit the power to the wheels, which are equipped with 2-inch solid rubber tires, both front and rear. The wheel base is 84 inches, and the weight is 1,500 pounds. Fully loaded, the truck will con-

sume 15 gallons for every 15 miles traveled on a level road.

The outside dimensions of the body are 42 by 96 inches, the inside dimesions, back of seat, are 4 feet 10 inches, by 40 inches.

For further information write the company at the address given above.

Needs of the Export Trade

American manufacturers and exporters have long recognized the need of some additional facilities by which they could be placed in closer touch with foreign buyers, particularly those in South America, Africa, Asia, Australia and other parts of the world where the markets are open. The lack of plan at present involves great expense to the manufacturer by the "hit-or-miss" distribution of catalogues, by the sending of personal representatives to foreign countries and by the loss of time which is involved before the foreign buyer and the American producer can be brought together. The situation is no more attractive to the foreign buyer. For his information concerning American manufactures he is dependent either upon past experience, the recommendation of some other business house, the suggestion of a consul, bank, or the sight of an occasional catalogue which he may or may not receive from one of the 65,000 American manufacturers who are looking for export trade. As the catalogue is generally printed in English, which language he often does not understand, and as it generally fails to state money equivalents in terms equal to his comprehension, he is more than likely to deal with the representatives of some of the European nations who seem to realize more clearly what the foreign buyer wants and how he wants it. The American representative abroad, the consul, is badly handicapped by lack of information concerning the American manufacturers; to this time he has had no properly prepared and complete information concerning the extent and variety of American products, knows little of the terms upon which goods are sold and rarely is able to recommend to the prospective buyer the particular manufacturer in whose products the buyer would be interested. As the result of this lack of "commonsense system" American trade is not pushed and opportunities are constantly lost which, through proper handling, could be secured to the benefit of the manufacturers of the United States. Our own government realizes this situation keenly and does all it is able to do, by the publication of its *Consular Reports* and notice of foreign trade opportunities. Here again is great waste, as the notice of the proposed business opportunity in coming from the consul to the Department of State and passing through the proper channels there before publication, is naturally delayed, and as a result, approximately three months will elapse before the American manufacturer and the foreign buyer are able to consult upon the business opportunity. The manufacturer blames the system in that he was not notified sooner. The fault lies with the lack of system.

Some years ago there was organized in New York a company which devoted itself to bringing the manufacturers and users of engineering supplies together, by the use of a simple system of distribution of catalogues, carefully and concisely briefed in card files. At the same time a library was opened in New York in which the manufacturers' catalogues were carefully filed and subindexed for reference, and in which was placed for examination every trade journal in the country, the use of the library being free to manufacturers and buyers, both local and those visiting New York. The plan met with success in the engineering supply trade, so many American buyers being placed in touch with the manufacturers of their supplies through this simple system, that it came to the attention of the government and the company was permitted by the Department of State to undertake the same service for American manufacturers in all lines of industry, distributing its carefully briefed sets of card catalogues to the American consuls all over the world, so that they, representing the government, might be in a position to expand our trade relations with actual buyers everywhere. In accordance with this privilege the Foreign Commercial Bureau was organized and is now sending to all American consulates its card catalogue files, showing American manufacturers in all industries. Once each month, in pursuance of this system, the bureau sends to the consular offices the new cards received from its subscribers, together with additions or alterations made in those previously filed. Needless to say the consuls are pleased, for, as their acknowledgements to the bureau show, it gives them information which they are able to use for the furtherance of American trade. To place in the hands of the buyers the actual catalogue, branch offices of the bureau are being established in the principal cities of South America, Africa, Asia and Australia, which points will act as distributing stations for the bureau, and in which catalogues may be examined by any buyer requesting them. The bureau estimates that upon the completion of its system it will be in a position to place the American manufacturer in direct touch with at least 10,000 buyers from all parts of the world, all these buyers to be actual prospects, each to have a credit standing and concerning whom information will be supplied. When it is considered that the personal touch is had with a genuine list of buyers and that the expense of distribution of catalogues, correspondence, etc., is eliminated, the small cost to the manufacturer of the use of the system installed by the Foreign Commercial Bureau as compared with the present expense, is almost negligible. The American manufacturer, whether he be large or small, can at once receive the benefits of the plan and take an active part in the much-desired extension of foreign trade.

Western Electric July Business

Business of the Western Electric Company for July was 3 per cent greater than for the corresponding month last year. For the seven months ended July 31, business was at the rate of over $67,000,000, which was the estimate made at the beginning of the year of what the company would do in 1912. In some portions of Western Electric's business, especially in lighting and general supply products, it was the largest July in the history of the company. Not only was the volume of orders larger, but prices were better than a year ago, and this condition is expected to continue. The portions of the country which seem to have responded most slowly to the increasing business are the West and the Pacific Coast, while in the East, South and Central West, demand has increased considerably over a year ago. Not only has the volume of orders actually completed and billed increased, but also the volume of orders taken during the seven months was larger than sales. In other words, orders on hand at the first of August were approximately

$1,500,000 greater than orders on hand the first of this year. Foreign business of the company is also good, and shows even a more satisfactory increase than that in the United States itself. This is partly due, no doubt, to the greater and more scientific efforts being made by the company to secure business outside of the United States as it is devoting a great deal of time and energy to extending its foreign trade. The number of employees of the Western Company at the end of July was about 27,000, or almost 4,000 more than at the beginning of the year. Plans have been made for some new buildings to be erected at Hawthorne, Ill., near Chicago, which will cost approximately $750,000, and which will take care of increases in business in the future. This construction follows out the company's general policy of concentration of the manufacturing part of the business at Hawthorne, where upwards of 11,000 people are now employed.

Calculagraph Catalogue

While nearly all of our readers are familiar with the success attained by the calculagraph in the telephone industry, they will, no doubt be interested in its further application in the manufacturing industries. The calculagraph is particularly adapted to the needs of manufacturers, as the method of recording the labor cost of the products is so simple and accurate. With the calculagraph it is possible to learn, without mental exertion, the exact time spent by any employe upon his work, and makes it possible to discard the costly, and inaccurate practice of having the men make out their own time.

Much useful matter is contained in the new booklet issued by the Calculagraph Company, 9-11-13 Maiden Lane, New York City, that will be of interest to telephone and electrical men in general, and we advise those interested to send for a copy. Typical systems are shown that may be applied to the different departments, and the operation of the machine itself is described in a clear concise manner.

Matthews Specialties.

We are in receipt of several circulars, issued by W. N. Matthews & Brothers, St. Louis, Mo., describing their boltless guy clamp, and guy anchor. The boltless clamp is very simple and actual tests made by the manufacturers show that they will hold more than five ordinary clamps having three bolts each. It is claimed that they can be put in place and tightened in less than three minutes.

The clamp is composed of two castings, one of which is a wedge. The strand is passed through the sleeve, then around the eye of the anchor, or around the pole, and then through the sleeve again. The wedge is driven in with an ordinary hammer until it will go no farther, and the job is finished. They are made in two sizes, one designed for use on ¼ in. and one on 5/16 in. strand.

The guy anchor made by this firm is too well known to need farther description in these columns.

Fight for Lower Rate in St. Joseph

W. B. Norris, city counselor for St. Joseph, Mo., is getting ready to defend the public utilities commission's order directing the Missouri and Kansas Telephone Company to reduce its rates for service in the city, during the September term of the St. Joseph division of the federal court. The order was made by the commission last January, but the telephone company has evaded enforcing it by obtaining an injunction against the city.

Great interest centers in the outcome of the board's ruling, as more than 10,000 patrons of the company would profit by a reduction of rebates. The order also is interesting because it is the first decided reduction of rates for any public utility ever ordered by the commission.

As ordered by the federal court, the company deposited a cash bond of $25,000, to be forfeited if the city wins the case, the amount to be prorated among subscribers to reimburse them for excess charges since the issuance of the board's order.

Boston District and Exchange Managers Meet

The third annual convention of the district and exchange managers of the New England Telephone and Telegraph Company, Boston, Mass., was held August 8, 9 and 10, at the hotel Somerset. The attendance numbered 150.

Opening remarks were made by General Commercial Superintendent Carl T. Keller and Commercial Engineer F. C. Munroe. Papers were read by Special Agent O. S. Quinn on "Preliminary Development Studies," and by Manager W. J. McLaughlin of Haverhill on "Treatment of Service Troubles." Special Agent R. L. Bronson spoke on "Development of Exchange Revenue."

The reception committee consisted of E. W. Pierce, C. J. Abbott of Worcester, E. T. Emerson of Bangor, Me., George Knox of Brockton, R. Robins, Jr., of Salem, and L. B. Stowe of Springfield.

Grain Men Ask for Cheaper Rates

The Illinois Grain Brokers' Association, comprising brokers in Champaign, Bloomington and Decatur, are asking of the commerce commission that they be given more reasonable telephone rates.

That the Bell Company, instead of allowing only three minutes' time for a distance call, meet the competition of the Kinloch Company and allow five minutes before charging overtime, and that all patrons be given the privilege of an $80 rate for a $100 coupon book, is the substance of their request.

As the grain men, on an average, pay the companies $100 a month each for telephone service they believe they are entitled to this concession.

New Copper Clad Booklet.

We are in receipt of a new catalogue, issued by the Duplex Metals Company, of Chester, Pa., that is of special interest to those engaged in the telephone industry. It is really more than a catalogue, as catalogues go, for it treats of the manufacture of Copper Clad in an interesting manner, and of the metallurgical theory of this most peculiar and efficient weld.

We would advise anyone interested in the subject of line wire to send for a copy before the edition is exhausted, as it is a valuable book. Space is also devoted to the application of the wire, which is accompanied by useful tables.

Brevities of the Business

PERSONAL NOTES.

Charles E. Demorest, in charge of the Iowa Telephone Company's exchange at Fort Dodge, Iowa, has been appointed commercial manager for the company at Carroll, succeeding D. McGarrity.

Charles H. Fish, manager of the Central Union Telephone Company at Beardstown, Illinois, has been promoted to the position of plant chief and has been succeeded as manager by J. K. Acton, of Bloomington, Illinois.

Mrs. Esther F. Young, Columbia, Pennsylvania, has been elected a director and president of the Columbia Telephone Company, of which her husband, H. C. Young, deceased, was president.

In appreciation of her long and efficient services, Mrs. W. E. Thomas, telephone operator for the Iowa Telephone Company, Des Moines, Iowa, was presented with a purse of gold when she severed her connections with the company after more than ten years of continuous service. Mrs. Thomas entered the service of the company in 1902 and resigned her position immediately after her wedding a short time ago.

William C. Fink, secretary and treasurer of the Bell Telephone Company, with offices at Philadelphia, Pennsylvania, died from an attack of blood poisoning, which set in after the amputation of one of his toes. He was ill but six weeks. His death was a surprise, as he seemed well along on the road to recovery. He was forty-nine years old and is survived by a widow and one son. Until six years ago he was treasurer of the Pennsylvania Telephone Company at Harrisburg. When it was consolidated with the Bell, of this city, he came here and assumed the office he held until his death. His offices were at 1230 Arch street, though he lived all the year at Atlantic City.

A. W. Metzger has severed his connection with the Insular Telephone Company, San Juan, Porto Rico. He is now with the Bell Telephone Company of Missouri at its plant department in St. Louis.

Allard Smith, the Bell Company's newly appointed engineer in Ohio, is located at Columbus. The systems of the Central Union and the Cleveland Telephone companies come under his jurisdiction, as do the others of the whole state.

F. W. Carroll has succeeded S. J. Jones as district manager of the Mountain States Telephone and Telegraph Company, in Ogden, Utah. He comes from Fort Collins, Colorado. Mr. Jones' transfer was to the Provo district.

Fred B. Patton, well known in the telephone world as the former president of the Sandwich Electric Company, is making a success in the insurance business in St. Louis, Missouri. He paid a recent brief visit to Chicago en route to a short stay in Fairdale, Illinois.

W. E. Bell is the new commercial manager for the northern district of the Lincoln Telephone and Telegraph Company.

Frank B. Cook, Chicago, took ten days' leave of absence from his August duties to motor through Michigan, Indiana and Ohio.

The life insurance business has lured F. M. Chandler from the local managership of the Iowa Telephone Company at Hampton, Iowa.

W. O. Nevill has resigned the special agency of the railway department of the Missouri and Kansas Telephone Company, at Kansas City, Mo.

R. G. Richardson, plant superintendent of the Helena Automatic Telephone Company, Helena, Mont., succeeds W. H. Young as local manager of the company. Mr. Young filled that position for the last three years.

Charles J. Miller, who is chief clerk in the contract department of the Kansas City Home Telephone Company, of Kansas City, Mo., spent his vacation in Chicago.

Walker and Dunn of Warren county, Iowa, are the new owners of the Acme Telephone Company of Albia, Iowa. The exchange will be under the personal charge of Mr. Dunn.

M. B. Conatser, J. F. Maxey, L. L. Ford, Whit Martin and W. C. Conatser of Ozark, Ark., have been elected directors of the Home Telephone Company of that city.

Frederick J. Heizelman, 54, a Toledoan, died at his home, 339 Nebraska avenue, Toledo, O., Aug. 15, after a lingering illness. Mr. Heizelman, during the years of his activity, was closely identified with the telegraph and telephone service of Northwestern Ohio, and managed the construction of several lines outside of Toledo. For several years past he was superintendent of the Toledo Home Telephone Company.

T. P. Ryan, district commercial manager, and H. H. Stanley, district plant chief of the Central Union Telephone Company have removed their offices to Springfield, Ill. The office of district traffic chief is maintained here in charge of P. M. Bradford, as heretofore. George P. Davenport, district traffic chief, has gone to Chicago, where he accepts a similar position in the Chicago offices of the company, his work to be consolidated with the work of the state chief in Springfield. The changes in no way affect the position of local manager, now held by E. R. Cogswell, but are made for the purpose of simplifying the service, this being a return to the method in which the business was formerly managed before the opening of the Bloomington offices.

C. H. Rottger, superintendent of the Illinois division of the Central Union Telephone Company, conferred with the city officials of Moline relative to the proposed improvements in the company's plant there. Among other things Mr. Rottger took up with the officials was the project of securing control of the plant of the Union Electric Telephone & Telegraph Company.

C. B. Luck, of Dallas, Texas, supervisor of plant accounting for the northwest Texas division, instructed the employees of the plant department of the Southwestern Telephone & Telegraph Company on the subject of plant accounting, at their recent session at Fort Worth.

An inspection of the telephone plant at Peoria, Ill., was made recently by C. H. Rottger, commercial superintendent of the Springfield Company and by the following Chicago representatives: S. J. Larned, assistant general manager and general traffic superintendent of the Central Union Telephone Company; W. R. Abbott, general commercial superintendent; F. A. DePeyster, traffic superintendent; W. R. McGovern, engineer.

E. O. Turner, who for the past year or two has been located at Tarkio, Mo., where he was general manager of a telephone company, has disposed of his interests there and has returned to Greene county to take charge of the local telephone exchange for the Illinois Telephone Company at Roodhouse.

Denis Roche, brother of John Roche, 1237 Guilford avenue, died in Quebec, Canada, Aug. 12. He was 40 years old, and had spent all his business life with the Bell Telephone Company, and at the time of his death was superintendent of the system at Quebec.

A. J. Schultz, manager of the Wisconsin Telephone Company, has taken full charge of the Fox River Valley Telephone & Telegraph Company's exchange at De Pere, Wis.

Frank O'Hare, for many years desk man in the office of the wire chief of the Kenosha, Wis., Home Telephone Company, has resigned his position and has come to Chicago to accept a position with Armour & Co.

L. Rooney, who has been collector for the Northwestern Telephone Company in Sioux Falls, S. D., has been appointed to the position of manager of the exchange at Luverne.

The Dauphin County Court made permanent the order appointing Theodore A. Lamb, Erie, as receiver of the Union Telephone Company, Harrisburg, Pa. The company operates in Erie, Crawford, Mercer and other counties, and an application to transfer the receivership proceedings to Federal Courts was denied.

C. O. Dillon has accepted the position of manager of the Tri-City telephone office in Fulton, Mo., and has taken possession of the office in the Snyder block over the postoffice.

Martin E. Olmstead, of Harrisburg, Pa., and Henry M. Tracy, of Philadelphia, have been appointed ancilliary receivers for the Cumberland Valley Telephone Company by Judge Rose, in the United States Court for the district of Maryland.

Jacob Myers & Sons and F. W. Van Loon, of Philadelphia, Pa., are figuring on a three-story exchange, 42 by 77 feet, at the northwest corner of Broad and Rockland streets, for the Bell Telephone Company.

O. C. Conatser, president of the Central Telephone Company, of Monterey, established an exchange at Oakdale, Tenn.

L. H. Clark, of the Valentine-Clark Company, has been appointed general manager of the company's western branch located at St. Maries, Idaho.

L. C. Griffiths was recently appointed general manager of the reorganized Interstate Telephone Company, and has assumed

active charge of the system, establishing his headquarters at Aurora. While it is not definitely determined, it is probable that the main office of the company will be located there, although the Chicago office may be maintained as well. According to Mr. Griffiths the physical properties of the company will be thoroughly overhauled and an active campaign for new business will be instituted at once, in Joliet, Aurora and Elgin.

F. E. Reiff of Detroit has been appointed manager for the Michigan State Telephone Company in the copper country, succeeding R. T. White, who has been transferred to the Grand Rapids district, where he will be a special agent.

D. Russell has resigned as manager of the Colusa County Telephone Company, Colusa, Cal., and will be succeeded by F. Lukenbill, of San Francisco.

NEW TELEPHONE COMPANIES

WILCOX, ARIZ.—The New State Telephone and Telegraph Company has been incorporated with a capital stock of $100,000 for the purpose of consolidating the Adams, Riggs and Courtland telephone companies, of northern Cochise county. The incorporators are D. A. Adams, T. J. Riggs, H. A. Morgan, J. H. Snyder and A. Y. Smith. The service will also be extended into new territory.

CLARKSVILLE, ARK.—A charter has been filed for the Johnson County Telephone Company, with a capital stock of $15,000.

SAN FRANCISCO, CAL.—The Telephone Users' Association has been incorporated by A. G. Rockel, C. E. Ward and G. D. Stein, with a capital stock of $10,000.

SAN DIEGO, CAL.—Hall's Sanitary Telephone Mouthpiece Company has been incorporated with a capital stock of $35,000 by Josephine Hall, S. H. Hall, Claude Woolman, A. C. Shreve and C. W. Barber.

CHICAGO, ILL.—The Swedish-American Telephone Manufacturing Company, has been incorporated with a capital stock of $60,000 by Donald L. Morrill, Gertrude Holz and William H. Johnson.

HARPER, KANS.—Articles of incorporation have been filed for the Nebo Telephone Company; capital stock, $1,000. The incorporators are F. E. Fulton, F. E. Bollman, B. F. Dunn, Frank Melvin, L. R. Andrews, Floyd Cornwall and C. F. Francis of Harker; T. W. Mott, Herington; F. W. Casthome, Wichita.

NUCKOLS, KY.—Articles of incorporation have been filed for the Farmers' Mutual Telephone Company with a capital stock of $2,000. The incorporators are W. M. Humphrey, J. D. Vance and others and a system will be installed in this place.

POORFORK, KY.—The Poorfork Telephone Company has been incorporated and will install a telephone system in Poorfork and vicinity.

SPRINGDALE, KY.—The Springdale and Tolesboro Mutual Telephone Company of which Landon Hull is president, has been organized to build a line from Springdale to Tolesboro.

ADDISON, MICH.—Articles of incorporation have been filed for the Mutual Telephone Company of Addison; capital stock, $3,000.

GRAND RAPIDS, MICH.—Burt K. Chaffee, Glen D. Chaffee, and Cecil E. Ambrose have incorporated the Vitaphone Sales Company, with $50,000 authorized capital, $25,000 subscribed and $5,000 paid in. The company will do a general jobbing business.

CHASELEY, N. D.—The Chaseley Co-operative Telephone Company has been incorporated with a capital stock of $25,000 by N. E. Kellems, Chaseley; G. D. Harrington, Bowdon, and G. F. Church, Chaseley.

DUNKIRK, OHIO.—The Dunkirk Mutual Telephone Company has been incorporated by Paul F. Dornbirer, B. F. McCloud, R. E. Clevenger, H. D. Jones, William McElree and W. H. Getz.

WEST HOPE, OHIO.—The West Hope Telephone Company has been incorporated with a capital stock of $2,000 by Fred Springborn, Louis Laing, George Sidell, Daniel Thurston and Ed. Frankfather.

ABERDEEN, S. D.—Articles of incorporation have been filed for the Farmers' Automatic Telephone Company with a capital stock of $10,000. The incorporators are J. L. Zeitlow, S. H. Collins and E. Oderkirk.

CORPUS CHRISTI, TEXAS.—The Corpus Laureles Telephone Company has been incorporated with a capital stock of $1,500 by J. A. Hill, H. M. Stockton and P. E. Morgan, of Corpus Christi.

NILE, WASH.—The Nile Valley Telephone Company has been incorporated with a capital stock of $2,400.

MATLOCK, WASH.—Articles of incorporation have been filed for the Matlock and District Telephone Company with a capital stock of $3,000. The incorporators are John Wharton, Clarence Barker, Marshall Palmer, Joseph Carstans and Joseph Valley.

CASS, W. VA.—The Cloverlock and Burbin Mutual Telephone Company has been incorporated with a capital stock of $1,500, by C. G. Wanless, H. L. Kesler and Allen Golford of Wanless; W. R. Moore of Stony Bottom and Max Curry of Case, W. Va.

ELK MOUNTAIN, WYO.—Articles of incorporation have been filed for the Inter-Mountain Telephone Company by Raymond D. Meyer, Frank C. Hunter and C. D. Williamson.

WILMINGTON, DEL.—The Massachuetts Telephone Herald Company, Wilmington, Del., has incorporated. Capital, $100,000 for the collection, storage and transmission of sound. Incorporators, R. Boyd Cooling, Wilmington, Del.; Clarence J. Jarvis, Wilmington, Del.; Harry W. Davis.

MONROE, ORE.—The Monroe Telephone Company has been formed with the following officers: President, Bird Rickard, of Irish Bend; secretary and treasurer, C. J. Currin, of Monroe; board of directors, the president and secretary with H. L. Wagner, F. M. Barnett and R. H. Hewitt. The association includes a large number of representatives, citizens of southern Benton county, has ample funds, and the board of directors is instructed to proceed at once with the purchase of material and installation of the system.

INDIANAPOLIS, IND.—The Dugger Mutual Telephone Company of Dugger was incorporated here by L. N. Earle, W. McClellan and J. H. Mason, with a capital of $1,500.

INDIANAPOLIS, IND.—The Broyles Telephone Company of Gaston received a charter here, the capital stock amounting to $6,000. The directors are H. A. Broyles, Sherman Broyles, H. M. Long, C. M. Broyles and W. H. Broyles.

PARSONS, W. VA.—The Duncan Telephone Company has incorporated with a capital stock of $3,000. The incorporators are: J. W. Duncan, J. W. Arnold, H. R. Duncan of Thomas, W. Va.; N. B. Miller and Maud Pennington, Parsons, W. Va.

CHEYENNE, WYO.—The Mountain States Telephone and Telegraph Company has finished the final work necessary for the commencement of construction of a local exchange and several rural lines. The Worland exchange will be connected with nearly all ranches within eighteen miles on the south and fifteen miles on the north, which country is all directly tributary to the town.

HUNTSVILLE, ALA.—A new telephone company has been organized at New Market with L. P. Esslinger as president and general manager. The exchange has opened with a list of 50 subscribers. Connections will be made with the Southern Bell here.

PHELPS, N. Y.—Harry F. Flint, former manager and minority owner of stock in the Phelps Home Telephone Company, who was forced to dispose of his holdings when the Friendship Company, a Bell subsidiary, absorbed them, will, it is announced, organize a new company to compete with the Bell in Phelps.

WYMORE, NEB.—As a result of the attempt of the local telephone company to raise the rates for services here, the Wymore Independent Telephone Company has been organized. It has been incorporated by local business men including J. Neumann, M. J. Moran, Dr. C. C. Gafford, F. E. Crawford and I. T. Cutshall. The capital stock is placed at $25,000 and the price of each share is $35. The organizers have been assured by the Burlington railway that the company will place phones in its offices here. Nearly every business man, citizen and farmer in this section has agreed to become a subscriber.

CLEVELAND, OHIO.—The Ohio Farmers' Line Company, with a capital of $10,000 is a recent incorporation. G. A. Schroeder and G. D. Williams, incorporators.

NEW WASHINGTON, OHIO.—J. E. Weis has incorporated the Cranberry Mutual Telephone Company.

MARYVILLE, MO.—With a view toward a merger of the twenty mutual telephone companies in this county a meeting of all representatives of the companies was held. The meeting was attended by the following agents of the various companies: W. L. Shoonover, W. A. White, John R. Evans, Albert S. Watson, Ernest Wray, J. A. Walker, F. S. Barber, H. K. Noel, H. M. Lincoln.

DAYTON, FLATHEAD LAKE, MONT.—A company is being organized here to construct a telephone line from the lake shore to Camas, a distance of 40 miles. This will put the western part of the reservation in direct connection with the rest of the country.

SCOTLAND NECK, N. C.—C. P. McClure, general manager of the Carolina Telephone and Telegraph Company, and Henry Murry, superintendent of construction, have made the preliminary

arrangements preparatory to rebuilding and remodeling the local telephone exchange. Mr. McClure told the writer that it was the intention of the company to put in a modern battery system.

PECOS, TEX.—For the first time in the history of the Pecos Valley conservation with this city and the metropolis of North Texas is possible. The new line is one of the best constructed telephone lines in the state.

OJATA, N. D.—The organization of a telephone company has been effected at Ojata, several residents and farmers in the district being interested. The lines are connected with the Northwestern Telephone Company's exchange.

WHEELING, W. VA.—Consolidated Telephone Company of Ohio, Wheeling, W. Va., has been organized to operate telephone lines; capital stock, $500,000. Incorporators: John L. Dickey, Samuel W. Harper, W. C. Handlan, Robert C. Dalzell, H. S. Sands, all of Wheeling, W. Va.

WHEELING, W. VA.—Consolidated Telephone Company of Pennsylvania, Wheeling, W. Va., has been organized to operate telephone lines; capital stock, $2,000,000. Incorporators: John L. Dickey, Samuel W. Harper, W. C. Handlan, Robert C. Dalzell, H. S. Sands, all of Wheeling, W. Va.

MADISON, WIS.—Miladore Telephone Company, Miladore; capital, $4,000. Incorporators: J. Verhulst, J. E. Malik and J. W. Cherney.

LYNCHBURG, S. C.—The Lynchburg Telephone Company has been commissioned with a capital stock of $1,000. The petitioners are S. W. Frierson, T. N. Griffin and C. E. Timmons.

SIMPSONVILLE, S. C.—A charter has been issued to the Home Telephone Company of Simpsonville, with a capital stock of $2,000. The officers are M. D. Fowler, president; F. D. Hunter, vice-president; L. L. Richardson, secretary and W. D. Fowler, treasurer.

NASHVILLE, ILL.—The Washington County Long Distance Telephone Company, Nashville, was incorporated with a capital of $2,500 by William H. May, William Marker and Henry Wellmuenster.

GEORGETOWN, S. C.—The Farmers' Telephone Company of Georgetown has been commissioned with a capital of $1,500. The petitioners are H. B. Springs, W. T. Turbeville and M. W. Pyatt.

COLUMBIA, S. C.—The Holly Hill Telephone Company has been commissioned with a capital stock of $1,500. The petitioners are S. J. McCoy, E. Murray, J. F. Felder, J. F. Folk and W. L. DeHay.

NORFOLK, VA.—An amendment has been filed for the charter of the Dozier Telephone Company of Seward, N. C., Forsyth county, changing the name to the Pfafftown Telephone Company and increasing the capital stock. C. A. Sprinkle is president of the corporation.

SALT LAKE CITY, UTAH.—Globe Telephone Repeater Manufacturing Company of Salt Lake. Capital stock, $20,000, shares $1 each. William Hopple, president; Like S. May, vice-president; Clarence Cramer, secretary; Vincent B. May, treasurer; Devcaux R. Wilson, additional director.

BRILLIANT, O.—The Bell Telephone Company has asked the town council of Brilliant, O., for a franchise that they may operate its lines in that town.

OKLAHOMA CITY, OKLA.—Secretary of State Ben F. Harrison has granted a charter to the Davis Rural Telephone Company; capitalized at $1,000. The incorporators are: Charles Hutchins, J. F. Ellis and W. M. Baughman.

WINCHESTER, KY.—At the last regular meeting of the city council a franchise was sold to the Old Kentucky Telephone and Telegraph Company for $1,000, subject to the same conditions and the same charter as a franchise granted to the Cumberland Telephone Company about two years ago, thus putting the two companies on an equal footing.

GASTONIA, N. C.—The farmers of the county have recently organized the Gaston Rural Telephone Company and have applied for a charter. Plans are under way for the construction of lines in various parts of the county.

COLUMBIA, S. C.—The Lynchburg Telephone Company has been commissioned with a capital stock of $1,000. The petitioners are S. W. Frierson, T. N. Griffin and C. E. Timmons.

COLUMBIA, S. C.—A charter has been issued to the Pinewood Telephone Exchange of Pinewood, with a capital stock of $1,000. The officers are: J. W. Weeks, president; B. R. Lide, vice-president; Walter D. Epperson, secretary-treasurer and general manager.

CORNWELL, N. C.—A charter has been issued to the Granville Telephone Company of Cornwell, Granville county, the objects being to construct and operate telephone lines. The authorized capital is $10,000, with $1,000 subscribed for by J. S. Watkins, J. M. Bennett and others.

FULTON, ILL.—The Mutual Telephone Company is to be reorganized. It is proposed to drop the old charter and issue a new one. The stockholders of the old company would then receive shares in the company newly organized.

FINANCIAL ITEMS.

NEW MINDEN, ILL.—The capital stock of the New Minden Telephone Company has been increased from $2,490 to $5,000.

HINDMAN, KY.—For the purpose of extending its lines the Knott County Telephone Company has increased its capital stock from $1,000 to $5,000.

PIKEVILLE, KY.—The capital stock of the Citizens' Telephone Company has been increased from $4,000 to $5,000.

WHITESBURG, KY.—The Whitesburg Telephone Company has doubled its capital stock, increasing it from $2,000 to $4,000, and will at once begin the construction of additional lines.

BAY CITY, MICH.—The Valley Home Telephone Company has been granted permission by the state railroad commission to issue $200,000 in bonds for the purpose of improvements and to take up old bonds.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company recently issued its sixtieth regular consecutive quarterly dividend amounting to $74,761.76.

SAGINAW, MICH.—Through the authorization of a $1,000,000 bond issue by the state railroad commission, for the Saginaw Valley Home Telephone Company, extensive repairs are to be made to the local equipment. The bond issue is a lien against the local equipment. There is $200,000 available immediately, which will be used to liquidate $100,000 first mortgage bonds, and $60,000 second mortgage bonds, notes and other obligations. The balance of the bond issue, $800,000, can be used for extensions and improvements.

CLEVELAND, O.—As a preliminary towards the absorption of the Cuyahoga Telephone Company, the Cleveland Telephone Company has filed an inventory of its property with the public service commission. This is in compliance with the order of the commission requiring the inventory before passing on a request for permission to increase the stock of the company from $3,000,000 to $4,000,000. The Cleveland Telephone Company places an actual physical value of $6,035,297 on its property, but says it would cost $8,070,262 to reproduce it.

JEFFERSON, O.—The Jefferson and Warren Telephone Company recently paid its sixtieth quarterly dividend of 2 per cent.

OTTAWA, O.—The Putnam Company has increased its capital stock from $100,000 to $125,000, of which $25,000 will be preferred stock.

ERIE, PA.—The charter of the Mutual Telephone Company has been amended increasing its capital stock from $300,000 to $1,000,000.

NEWPORT, VT.—The Passumpsic Telephone Company has been granted permission by the Public Service Commission to increase its capital stock $41,250, to be sold at par and the proceeds to be used in the purchase of the plant and property of the Citizens' Telephone and Telegraph Exchange at St. Johnsbury.

CHICAGO, ILL.—The New England Telephone and Telegraph Company has declared the regular quarterly dividend of 1½ per cent, payable September 30, to stockholders of record September 10.

SPOKANE, WASH.—The county board of equalization reduced the assessment on the franchise of the Home Telephone Company to $20,000 after it had been made at $25,000.

COLUMBUS, O.—Officials of the Pomeroy and Middleport Telephone Company have filed a petition with the public utilities commission asking permission to sell 2,315 shares of common stock representing approximately one-fourth of its authorized capitalization of $50,000 in order to pay debts which have accrued through construction and improvements. The par value of the stock is $5 and it is quoted at $4.

EL PASO, TEX.—The Tri-State Telephone Company has bought all of the physical properties of the old Southern Independent Telephone Company, paying for the entire physical equipment $215,000. The contract for the sale was made with Henry Lepp, of De Soto, Mo., and A. E. Wentworth, of Chicago, directors in the Independent company, who bought the plant at the receiver's sale. The purchase does not include the franchise, contracts of anything but the plant proper.

DAVENPORT, IA.—The Union Electric Telephone Company has offered the Moline city commission $5,000 if it will allow it to sell its plant in Moline. The company claims that it has been

offered $295,000 for its holdings in the tri-cities but refused the offer. It claims further that it offered the same holdings to the Automatic Company for the same price, which the Automatic said it was not yet in a position to consider.

Representing the Union Electric before the commission were L. J. Wolfe, F. L. Beatty and E. J. Burns. The Moline commission expressed itself to the effect that the consideration was not sufficient.

DALLAS, TEX.—The Dallas Automatic Telephone Company filed with the city commission a petition for approval of a charter amendment allowing the Telephone Company to increase its capital stock by $200,000. It was shown that the company also expects to issue $250,000 of the $500,000 bonds provided for.

The additional funds will be used, the petition relates, in paying for construction completed and planned "exceeding the original program by nearly fifty per cent."

NEW YORK.—The New York Telephone Company has purchased the Dutchess County Telephone Company for $33,050, subject to a mortgage of $96,000 and the Interstate Telephone Company—Little Falls, St. Johnsville and Dolgeville—for $147,600.

JACKSON, MISS.—The quarterly statement of the telephone companies in the state as received by the railroad commission show that the Mississippi Home company of Jackson shows a greater increase in revenues, while the American express Company shows a very large decrease of business and of revenues.

CLEVELAND, O.—Permission was given the Cleveland Telephone Company by the state service commission to issue $900,000 additional stock to be sold at par. The increase brings the outstanding stock of the company up to the authorized figure, $4,000,000. The proceeds from the sale of the stock will be used to pay off notes of the company issued to supply funds for improvements, extensions and betterments during recent years. These notes bear 6 per cent, while the stock to be issued will pay but 5 per cent. The company will save $9,000 in interest each year as a result of issuing the stock.

BUTLER, PA.—The People's Telephone Company, of Butler, has filed notice of an increase of stock from $50,000 to $180,000.

PHILADELPHIA, PA.—For the half year ended June 30 the Keystone Telephone Company makes a little better showing than it did for the first half of 1911. Gross earnings increased $15,882 to $597,191 and operating cost increased $11,774 to $298,696. There was an increase also of fixed charges amounting to $3,928, so that the net surplus is $148,253, which compares with $148,073 for the corresponding month of last year. In June there was an increase in gross receipts of $4,066 to $101,111, but the net surplus was only $24,787, as compared with $26,325 in June of last year.

DESMOINES, IA.—At $35 each, 300 shares has increased the capital stock of the Jefferson County Telephone Company to $10,500.

VINCENNES, IND.—The release of a $6,000,000 mortgage given by the Central Union Telephone Company to the Old Colony Trust Company of Boston, and the release of a $3,000,000 mortgage given by the Telephone Company to the Illinois Trust & Savings Bank of Chicago, were filed with County Recorder G. L. Shepard. The mortgages covered all the telephone company's property in Indiana, Illinois and Ohio.

PHILADELPHIA, PA.—There has been listed on the Philadelphia Stock Exchange $3,554,800 additional capital stock of the American Telephone and Telegraph Company, and $2,300 additional stock of the American Milling Company.

NEW BLOOMFIELD, PA.—The Perry County Telephone and Telegraph Company of New Bloomfield, which is building lines in that county, has given notice of increase of its stock from $17,000 to $20,000. The A. J. Holman Company, of Philadelphia, recently chartered, filed notice of increase from $10,000 to $250,000.

COLUMBUS, O.—The sale of the Sycamore Telephone Company, that is now owned by a group of investors, will be made to the new corporation organized under that name, sanction for the sale having been given by the Public Service Commission. The sale price is $45,000.

CHICAGO, ILL.—The Chicago Telephone Company has closed negotiations with the Northwestern Telephone Company of Indiana, whereby the Chicago Telephone Company takes over all stock of the latter company. The capital stock of the Northwestern Telephone Company is $25,000, divided into about 1,100 shares. The proposition to sell the Northwestern Company was voted on by shares, 776 voting in favor of the sale. A deal is also pending according to B. E. Sunny, president of the Chicago Telephone Company, whereby that company will take over the lines of the Crown Point Telephone Company.

FREEPORT, PA.—An increase in capital stock of the Freeport Telegraph and Telephone Company of Armstrong county has been made from $30,000 to $50,000.

LOUISVILLE, KY.—Butler County Mutual Telephone Company, Butler county, has increased its capital from $720 to $1,440.

WATERLOO, ILL.—Farmers' Fountain Telephone Company, Waterloo, increased its capital from $10,000 to $15,000.

CRAWFORDSVILLE, IND.—The Central Union Telephone Company has bought the plant of the Home Telephone Company in this city and assumed control. The price is given as $100,000.

MT. VERNON, ILL.—The Old Colony Trust Company and the Illinois Trust & Savings Bank has filed two mortgages for release on the Central Union Telephone Company. The instruments aggregate $9,000,000. They are filed in every county in Illinois, Indiana and Ohio in which the company operates.

ROCHESTER, N. Y.—Directors of the Stromberg-Carlson Telephone Manufacturing Company met recently and declared a dividend of $38.58 on the preferred stock—25.58 per cent is to pay the full amount accumulated dividends on the stock and 10 per cent is toward liquidating the par value of the preferred stock. No definite steps have been taken towards the organization of the company, but such action has been decided on.

FRANCHISES ASKED AND GRANTED.

SOUTH PASEDENA, CAL.—The Home Telephone and Telegraph Company of Los Angeles has been granted a 40-year franchise by the city trustees.

JACKSONVILLE, FLA.—A syndicate, of which A. S. Metzner is the head, has been granted a franchise to install an automatic telephone system, but the franchise must be ratified by a special election.

MOLINE, ILL.—The Central Union Telephone Company has been granted a franchise in this city and contemplates the expenditure of $250,000 in improving its plant. The question of a franchise has been in controversy since 1903, when the franchise was repealed. The company expects to spend $120,000 on conduit work which must be completed within a year.

MOORHEAD, N. D.—The Tri-State Telephone Company has petitioned the city council for the grant of a franchise which will allow the company to maintain toll stations for long distance calls at different points in Moorhead which is regarded as preliminary to establishing a local exchange.

CONSTRUCTION.

LARAMIE, WYO.—H. J. Huling, manager of the local exchange of the Mountain States Telephone Company, has received the consent of the directors and officials of the company to spend a large sum of money in improvements and extensions. To outside improvements alone $15,000 will be devoted. The whole plant will be remodeled and improved, and when completed the Laramie exchange will be one of the most modern and best equipped in the territory of the Mountain States Company.

TOPEKA, KAS.—Extensive repairs and alterations are being made in the exchange building of the Missouri and Kansas Telephone Company on Jackson street. Practically the entire interior of the building will be remodeled in order to facilitate the handling of the increase in business since the consolidation of the two exchanges.

MOULTRIE, GA.—Colquitt county will soon be spanned by a most admirable telephone system and it will not be long until there will be a telephone line in every section of the county. The latest town to install a telephone system is Berlin, the finishing work being done last week. W. W. Fender, of Valdosta, is the president and manager of the telephone line.

ALBANY, N. Y.—The Public Service Commission, Second District, has been advised by Our Own Telephone Company that a number of improvements will be made in its Chittenanga exchange. Included in the improvements will be the moving of the central office. Some of the improvements had been planned by the telephone company, while others are the result of an inspection made by one of the commission's inspectors.

MEMPHIS, TENN.—An improvement permit was taken out by the Cumberland Telephone and Telegraph Company. The company applied for permission to construct another story on top of its exchange building on Madison avenue. The space is to be occupied by reading and rest rooms for employes. The cost, as set forth in the permit, will be $11,000.

ALMA, MICH.—The Bell and Union Telephone Companies, convinced of the future growth of Alma, have provided the city with a conduit system costing thousands of dollars.

PONCA CITY, OKLA.—On Grand avenue all telephone and tele-

graph poles have been ordered off and all wires will be carried in underground conduits, in order to carry out Wichita's plan of a "white way."

LAFAYETTE, IND.—The Wabash railroad is announcing the completion of its telephone train dispatching system along the entire road, and is thus far in line with other railroads in praising the beneficial effect of the telephone over the telegraph system, because it gives the train crews driect personal communication at any and all points with the train dispatchers. The Pittsburg & Lake Erie Railroad is meeting with the same reports and satisfactory results. The Pennsylvania Railroad is developing the same system along its lines east of Pittsburg. It is believed that the bell has about rung on telegraph service for dispatching trains on all leading trunk lines on railroads.

LAUREL, MISS.—Work on rebuilding the telephone exchange has been resumed.

DEPERE, WIS.—The Wisconsin Telephone Company will make many improvements in this district on its toll lines and exchanges. It has approved an estimate for deferred repairs on toll lines amounting to $11,601 and for exchange repairs $3,912.

MACON, GA.—Extensive improvements are being made at the Southern Bell Telephone and Telegraph Company. The extensions will cost about $50,000. New lines are being put up in the residence districts of the city and the underground cables are to be overhauled. Special extensions will incorporate the farmers' lines near Macon. Inside the city new poles, lines and boxes will be put into service and provision will be made for great expansion in the system that will take care of the growth of the city for several years.

PLATTEVILLE, WIS.—The Farmers' Telephone Company is expending between $2,500 and $3,000 in putting in a cable on the chief lines of the city. This means an increase in the efficiency of the service within the city. The company hopes to extend this service to other parts of the city within a short time.

LACROSSE, WIS.—The Tri-State Telephone Company is putting up heavy copper wires which will afford two additional circuits to St. Paul and Minneapolis. This will give the needed additional facilities to the new 'phone for telephone service north.

SPRINGFIELD, MO.—The work on the new Missouri-Kansas Telephone Company's building is going on at full speed now. The new switch board will be sufficient for 5,600 straight lines, but as there will be more than one telephone on a line, about 9,600 telephones can be used.

WHITESBURG, KY.—The Whitesburg Telephone Company is making preparations to extend its local and long-distance lines along the extension of the Lexington & Eastern Railroad from Whitesburg to McRoberts, the new industrial city on Wright's Fork. Connection will also be made with Jenkins and suburbs.

READING, PA.—The Bell Telephone Company is erecting several new lines east of town near Windsor Castle. Nearly all the prominent farmers in this section are now connected with the Bell system through the Hamburg exchange, which is by far the largest outside the city of Reading.

BAY CITY, MICH.—The Valley Telephone Company is considering an automatic switchboard for Bay City. "The Valley Telephone Company will spend in the neighborhood of $200,000 in rebuilding its Bay City plant," said Luther Beckwith, one of the directors.

CLARKSVILLE, TEX.—The Home Telephone Company of this city has completed extensive additions to its system, including underground cables across the public square, new switchboard and other modern equipment, adding a large number of new subscribers. This company is now completing construction of a number of country lines.

IRON MOUNTAIN, MICH.—J. F. Martin, district manager for the Michigan State Telephone Company, has been notified that $13,000 has been added to the original appropriation of $18,000, making a total of $31,000, to be expended in reconstructing and remodeling the telephone system in this city. The additional appropriation will be spent on outside improvements.

NORTH BLOOMFIELD (NEVADA CO.).—Work is being conducted on the new sixteen-mile telephone line that will be built between this place and the ranger's station at Miller's ranch, near the Mountain house. The line will be built by the forest service of the national government and the work will be under the supervision of Forest Ranger J. H. Horwege.

ALBANY, GA.—Over $20,000 was expended by the Southern Bell Telephone and Telegraph Company in improvements that have just been completed in this city, and on building a new toll circuit from Albany to Thomasville.

PITTSBURG, PA.—The Chesapeake and Potomac Telephone Company will build a three-story exchange on the northwest corner of Thirty-first street and Guilford avenue. It will be equipped with all of the latest telephone exchange equipment and is to cost about $75,000.

ST. MARIES, IDAHO.—Work has been begun on the new telephone exchange to cost $9,000 at St. Maries, Idaho, on completion of the plans by J. W. Fisher of Spokane, manager of the Interstate Telephone Company, Ltd.

RATES.

LINDSAY, CAL.—The Lindsay Home Telephone and Telegraph Company petitioned the Railroad Commission for permission to increase its rates from $1.50 to $2.50 per month, which was refused, but a special rate of $1.75 was allowed for desk telephones.

DENVER, COLO.—The Denver Business Men's Association is making an effort to regulate telephone rates. An ordinance has been prepared which stipulates that the rate for the unlimited business telephones shall not be over $7 per month and that unlimited residence telephones shall be had for $3 per month. An effort will also be made to secure much lower measured service.

MCCOOK, NEB.—Complaint has been made to the railway commission against the Nebraska Telephone Company, demanding a reduction of 33 1-3 per cent in rates, making the new rate $2 for individual business telephones and $1.33 for individual residence telephones, which is about the scale prevailing in other cities of the same size.

OKLAHOMA CITY, OKLA.—Application has been filed with the Corporation Commission by the Fort Supply Telephone Company to increase its rates at Buffalo to $1.25 for house telephones and $2 for business telephones, the present price of each service being $1.

SYRACUSE, N. Y.—The New York Telephone Company has announced a toll rate of 5 cents effective in either direction, between Solvay and Syracuse. Subscribers in Syracuse and Solvay are deeply aroused and a complaint has been made to the Public Service Commission at Albany which has the matter under consideration.

LANSING, MICH.—G. M. Welch, commercial superintendent of the Michigan State Telephone Company, has written to the state railroad commission that a raise in rates may be expected in many cities of the state, as the company is not realizing sufficient earnings on its investments.

MEMPHIS, TENN.—Telephone rates in Memphis have been reduced to a basis similar to that of the rates in Louisville, Ky.

LINCOLN, NEB.—At a special meeting held in Bethany to consider the telephone situation, Manager Hurtz held the floor a large part of the evening, answering questions and explaining that the matter of rate increase was up to the railway commission to decide. The people of Bethany were asked what kind of telephone they preferred, but as the matter had been decided for University Place and it was not likely that Bethany would be given a different kind of telephone, no expression was proffered. There was some talk after the meeting of organizing an independent telephone company to serve the village, but some hesitancy was shown in discussing that matter by some of the citizens. The only action taken at the meeting was in the form of a motion passed voicing the opposition of the patrons of Bethany to an increase in rates.

BRISTOL, TENN.—The board of mayor and aldermen of Bristol, Tenn., has notified the Bristol Telephone Company, a local independent company, that unless it forthwith reduces its rates in accordance with provision of its franchise, steps will be taken to have the franchise annulled. The company was given a franchise about 20 years ago with the provision that it should furnish telephone service at the price of $1.25 per month for residence and $2 per month for a business telephone. Since that time it has installed the "metallic" service, for which it charges rates in advance of those mentioned above, although it still gives what is called a grounded service at the rates provided in its franchise.

HICKMAN, KY.—At a meeting of the directors of the Home Telephone Company it was deemed necessary to raise the rates on telephones. Business telephones were raised from $1 to $1.50 per month, and residence telephones on party line from 50 to 75 cents. The raise was made in order to create a surplus with which to renew some of the equipment. At this meeting A. W. Davis was made general manager for another year.

FREMONT, O.—The deal was closed whereby the Fremont Home Telephone Company will take over the plant and exchange of the Central Union in this city and merge the two exchanges, the Bell people retaining the long-distance business. The Home Company will increase its capital stock from $150,000 to

$200,000, and will submit a new schedule of rates to the Public Utilities Commission which it desires to charge Fremont telephone users. The local plant is to be rebuilt.

ATCHISON, KAS.—The new rates adopted by the Bell Telephone Company are as follows: Business telephone, single line, $3; two party lines, $2.50; residence telephones, single party lines, $1.50; two party, $1.

MISCELLANEOUS.

COAL HILL, ARK.—The telephone systems in this place have been purchased by the Johns County Telephone Company, recently incorporated at Clarksville. The new company will also install systems at Lamar and at Clarksville.

PEORIA, ILL.—At the annual meeting of the Citizens' Telephone Company the following officers were elected for the ensuing year: President, J. M. Barrett; vice-president, H. G. Herget; secretary-treasurer, John Fitzgerald. Reports for the year showed the affairs of the company to be in good condition.

LOS ANGELES, CAL.—The Telephone Reform Association, a recently organized body with headquarters in the Bryson building, has instituted a campaign which has for its purpose the elimination of one of the telephone companies operating in this city, or their merger.

HOOPESTON, ILL.—The Farmers' and Merchants' Telephone Company of this place has been taken over by the Cadwallader Telephone Company, recently incorporated at West Lebanon, Ind.

RIVERSIDE, CAL.—The matter of consolidating the two telephone companies operating in this city has again been taken up by the Chamber of Commerce. As the franchise of the Pacific Telephone Company will soon expire and the United States Supreme Court holds that the company may not operate without a franchise this opportunity is siezed upon for bringing about a consolidation of the Pacific and Home systems. A committee consisting of Charles L. Reynolds, S. J. Castleman and S. S. Patterson has been appointed to urge this matter upon the city council.

BLOOMINGTON, ILL.—The Arrowsmith Telephone Company has arrived in circuit court by means of a suit filed by L. Y. Means against W. W. Lane. The suit is in assumpsit and asks for $500 for the alleged failure to carry out a contract.

GREEN BAY, WIS.—The De Pere Valley Telephone system has been connected with the Bell, a trunk line having been run between the long distance boards of the two offices. The Valley office will be abolished. R. Wedeman, who has been manager of the Valley system has resigned to accept a position with the Silo Building Company. He will be succeeded by J. G. McEnery of Sterling, Ill., who was formerally manager of the Bell Telephone Company here.

DICKINSON, N. D.—The North Dakota Independent Telephone Company has purchased the property of the Glen Ullin Telephone Company, which includes the exchanges at Glen Ullin and Elgin and their rural lines. They will make considerable improvement on the property.

AMARILLO, TEXAS.—J. E. Nunn and associates sold to the Southwestern Telephone and Telegraph Company their long distance lines in the Texas Panhandle, known as the Northwest Texas Telephone Company, the consideration being $101,000.

CROSSETT, ARK.—A new telephone exchange has been put into operation here and new cable wires have been connected. It is under the management of Benjamin Walsh.

PLAINVIEW, TEXAS.—A deal has been consummated whereby the Southwestern Telephone Company has become the owner of the entire system of the Northwest Texas Telephone Company. The consideration was $101,000. The exchange will probably be made about Oct. 1. The old company had undertaken extensive improvements at Plainview—the erection of a new brick exchange building, the installation of a flash light system, etc.—which plans, it is reported, the new owners will carry out.

HARRISBURG, PA.—S. R. Caldwell of West Chester, Pa., has been appointed temporary receiver for the United Telephone & Telegraph Company of Philadelphia. The United is a subsidiary of the American Union Telephone Company, which is in the hands of receivers named by the United States Court. Mr. Caldwell is secretary and treasurer of the United, which has a number of lines in eastern Pennsylvania.

GROVE CITY, OHIO.—The Citizens' Telephone Exchange has been destroyed by fire.

FREMONT, OHIO.—The Fremont Home Telephone Company will take over the plant and exchange of the Central Union in this city and merge the two exchanges, the Bell people retaining the long distance business. The Home Company will increase its capital stock from $150,000 to $200,000 and will also submit a new schedule of rates to the public utilities commission.

BURLINGTON, IOWA.—The Iowa Telephone Company is preparing to do away with its four party "code" service and those who pay a dollar a month for this service, are being invited to pay $1.25 per month for the four party "selective" service.

VIDALIA, GA.—Tentative contracts have been made between the local telephone company and the Bell Telephone Company whereby the Bell people will become the owners of the telephone property in the city and local toll lines and heirs to the future business of the section served by the local company.

AUSTIN, TEXAS.—The South Texas Telephone Company changed hands at a meeting of the board of directors held in this city. The new officers and directors of the company are: J. B. Earle of Waco, president; Ben C. Hyde of Kansas City, vice-president; E. C. Blomeyer of Waco, secretary, and Ed S. Hyde of Kansas City and Buford Adams of Waco, directors.

SPENCER, N. D.—The Southern Railway Company has begun the use of a new telephone system installed between Spencer and Monroe, Va., for the handling of trains. It is said that the telephones are giving entire satisfaction and in some cases are quicker than the telegraph.

MONTAGUE, MICH.—The United Home Telephone Company has removed its central office from Montague to Whitehall, the object being, to cut expenses.

WACO, TEXAS.—J. B. Earle and Ben C. Hyde are now in possession of all the toll lines and exchanges of the South Texas Telegraph and Telephone Company.

APPLETON, WIS.—The Wisconsin Telephone Company has taken possession of the property of the Fox River Valley Telephone and Telegraph Company, following a meeting of the two companies in Chicago, when $150,000 of the $350,000 sale price was paid in cash, under direction of the railroad commission, which granted permission for the transfer.

QUINCY, ILL.—The city council of Quincy has declared telephone and telegraph poles in the central part of the city a nuisance and ordered all wires to be placed underground by June 1, 1913.

BOSTON, MASS.—The Lehigh Valley Railroad, one of the first to authorize the installation of the system, has equipped its main line and many of its branch lines with telephone dispatching circuits, and all its trains with portable telephone apparatus. Not only this, but portable telephones, with the eighteen-foot sectional "fish poles," have been supplied to bridge and rail-laying gangs, track supervisors, work trains, tool trains, train masters and superintendents. More than eighty so-called siding telephones have been placed in booths and freight houses are connected with the telephone dispatching circuits.

CINCINNATI, OHIO.—Plans are being made for the erection of the ten-story building to be owned by and the home of the Cincinnati and Suburban Bell Telephone Company. In laying out the general scheme, President Bayard Kilgour laid particular stress upon providing adequate quarters for the comforts of the many operators, for the benefit of whom the roof of the skyscraper will be fitted as a rest garden.

POMONA, CAL.—With the approval by the state railway commission of the contract between the Home company and the Sunset company, the dual telephone system has been abolished, and the Sunset company has abandoned the local field. The decision approves an arrangement by which interchange of switching will prevail between the two companies. The Pomona company will furnish the local and the Pacific the toll service, with complete connection between the two. In its order permitting the Pacific company to release the Pomona field to the Pomona company, the commission requires a definite standard of service, fixing the time within which calls must be answered and connections made, Pacific telephones are now being removed. Under the new arrangement any Pacific or Home telephone in Southern California can be reached from the telephones of the other company.

CHICAGO.—According to Alonzo Burt, first vice president and treasurer of the Chicago Telephone company, there were 10,000 more telephones in operation in Chicago and suburbs on July 1, 1912, than on the first of the year.

For the first six months of 1912 the gross revenue of the company was $6,900,000. For 1911 the company earned a gross of $12,479,000.

BATTLE CREEK, MICH.—For the last month all trains over the Battle Creek, Allegan and South Haven divisions of the Michigan Central have been dispatched by telephone direct from the chief train dispatcher at Jackson, instead of by wire, as was formerly done.

ST. LOUIS, MO.—The Wabash Railroad is one of the latest

roads to equip its lines with telephones for train dispatching and an order has been placed for the necessary equipment with the Western Electric Company.

The American Telephone and Telegraph Company has issued a report of the number of "talks" over the telephone in the world. It shows that there were twenty-two thousand million talks during the year 1911 and that fourteen thousand million of them were in the United States.

Comanche, Tex.—The Comanche Telephone Company and the Southwestern Telephone Company sustained heavy losses in the recent fire, which hurt the city of Comanche to the extent of $30,000.

Hibbing, Minn.—Hibbing will be the first town on the range to declare against overhead wires, and the general appearance of the city will be considerably enhanced. There is no objection on the part of the companies affected. The city council at a special meeting passed an ordinance requiring all electric wiring on Pine street and Third avenue to be put underground.

Duquoin, Ill.—The Ohio and Mississippi Valley Telephone Company, the largest combine of the kind in Southern Illinois, has acquired the Leads independent system in Carbondale, a competitor.

The Ohio and Mississippi interests include the systems at Duquoin, Marion, Murphysboro, Pinckneyville, Carbondale, Anna, Benton and West Frankfort.

A. B. Minton of Murphysboro, who is a heavy stockholder in the company, is president and general manager of the system.

Paducah, Ky.—It is reported that the Paducah Home Telephone Company and the East Tennessee Telephone Company are to be merged in the near future.

Oklahoma City, Okla.—Two hundred telephones of the Pioneer Telephone Company were simultaneously ordered out here by subscribers, and will be discontinued until the service is improved and made satisfactory. The telephone company claims that the electric light wires are strung too close to its wires and that the company is not to blame for the poor service.

Delight, Ark.—The Delight Telephone Company, of Delight, has surrendered its charter.

Louisville, Ky.—In keeping with a policy which the Postal Telegraph Cable Company is said to be following in several western states, the company filed amended articles of incorporation here by which it is enabled to maintain telephone as well as telegraph lines.

Paducah, Ky.—It is reported that the Paducah Home Telephone Company and the East Tennessee Telephone Company are to be merged in the near future. District Manager L. L. Billups, of the latter company, says he has not heard anything of a merger, but business men have, and at an early date an announcement to this effect would not be surprising.

Crawfordsville, Ind.—The Central Union Telephone Company has purchased the Home Telephone Company of this city for $100,000. A slight increase in the charge for service is contemplated. The Home Company was organized here about ten years ago.

Galveston, Tex.—The Southwestern Telegraph and Telephone Company will wire the entire length of the race course, and this service will be used to keep the officials in the judges' stand and also those stationed at each end of the course in close touch with each other.

Washington, Ill.—The Washington City-Rural Telephone Company has been taken over by the Washington Home Telephone Company, recently incorporated.

Jacksonville, Ill.—Through a deal which has been hanging fire for some time the Waverly Telephone Company has purchased the Bell Telephone Company's interests in Franklin and the two lines will be consolidated which will give Jacksonville people connection with that place over either line.

Minneapolis, Kans.—An agreement has been reached for the consolidation of the Farmers and the United Telephone companies, both operating in this place. The Farmers Company will be absorbed by the United Company.

Jackson, Ky.—The People's Telephone Company has been taken over by the Cumberland Telephone and Telegraph Company.

Louisville, Ky.—L. B. Flinn, W. F. Klair and H. G. Garrett, of the Kentucky Railroad Commission, have signed the resolution favoring the consolidation of the Cumberland Telephone and Telegraph Company, the Hopkinsville Telephone Company, the Pembroke Home Telephone Company and the Todd County Home Telephone Company. The new concern will be known as the Christian-Todd Telephone Company and will be alowed to operate a telephone system in Christian and Todd counties, on condition that the charges for the consolidated service do not exceed the charges of the present companies for similar service.

Swanville, Minn.—The Morrison County Telephone Company has been purchased by the Northwestern Company. The former company was established several years ago by John Stroman.

Phelps, N. Y.—The New York Telephone Company has purchased a controlling interest in the Phelps Home Telephone Company.

Columbus, O.—The stockholders of the Western Telephone and Telegraph Company have voted to dissolve the company. The directors will set a date for the sale of the company's assets, when they will be bid in by the American Telephone and Telegraph Company which owns 99 per cent of the outstanding stock.

Aberdeen, S. D.—Articles of incorporation have been filed for the Farmers' Automatic Telephone Company of Aberdeen, with a capital stock of $10,000. The incorporators are J. L. Zeitlow, S. H. Collins and E. Oderkirk and the purpose of the company is the manufacture of the telephone device patented by F. E. Granger, of Aberdeen. It is for the exclusive use of the farmers' lines. It is so constructed that it abolishes the continuous ringing at every farmhouse along the line and also provides for a secret conversation. It is constructed with a dial similar to the automatic telephones now in use and the party wanted is called in similar fashion.

West Lebanon, Ind.—The Cadwallader Telephone Company has been incorporated with a capital stock of $9,000, to operate in Benton, Fountain, Tippecanoe, Vermillion and Warren counties. It is a consolidation of the Farmers' and Merchants' Cooperative Telephone Company and the Cadwallader Telephone Company. Ira Cadwallader is president of the new organization. The new company has exchanges at Williamsport, West Lebanon, Marchfield, State Line, Pence, Tab, Rainesville, and Judyville in Warren County and Ambia in Benton County. Its headquarters will be at West Lebanon.

Plainville Kan.—The Kansas Central Telephone Company was recently incorporated with a capital stock of $100,000 for the purpose of developing telephone interests in central and western Kansas. The officers of the company are: President, J. O. Wilson, Salina; vice-president, A. T. Rodgers, Beloit; secretary and treasurer, C. L. Brown, Abilene; assistant secretary and treasurer, O. T. Kimmel, Plainville.

Marysville, O.—The Central Union Telephone Company has filed a petition with the Public Service Commission, asking permission to sell its long distance service in this place to the Union County Telephone Company. The latter company was also given authority to sell its exchange at Ada to the Ada Telephone Company.

Medford, Ore.—The Home Telephone Company, operating in Medford and the Rogue River Valley, has taken over the entire equipment of the Pacific Telephone and Telegraph Company, and hereafter there will be one telephone system in Southern Oregon. The consolidation will mean the merging of systems valued at $1,000,000. The new officers of the company are as follows: President, W. H. Gore; vice-president, C. L. Reames; secretary and treasurer, George C. Ulrich; manager, A. J. Vance.

Gleason, Tenn.—The Gleason Rural Telephone Company has elected the following officers: President, Dr. J. E. Goldsby; vice-president, A. D. Call; secretary and treasurer, George Brummitt. The directors report the company to be in a prosperous condition and continually growing.

Port Arthur, Tex.—The South Texas Telephone Company intends to spend $10,000 for new construction on its plant in this city within the next twelve months. The company has about reached the limit of its facilities here. General Manager Shelley states it will take approximately $20,000 to install equipment capable of taking care of business for five years.

Galveston, Tex.—The Southwestern Telephone and Telegraph Company has purchased from E. W. Bostwick the telephone system in this city, with the local community lines centering here, and has taken possession of same.

Fredericksburg, Va.—The Tidewater Telephone Company has purchased the lines and franchises of the Upper Rappahannock Telephone Company, consolidating the two under the management of H. E. Hutcheson, of Gloucester.

Spokane, Wash.—The Inland Telephone and Telegraph Company recently ordered fifty carloads of material for the construction of its system, said to include the largest order ever given for telephone wire in the inland northwest, approximately 1,000 miles.

Oshkosh, Wis.—The Shiocton Telephone Company, owned by E. R. Bowerman, has been purchased by Walling and Kimberly, of this city.